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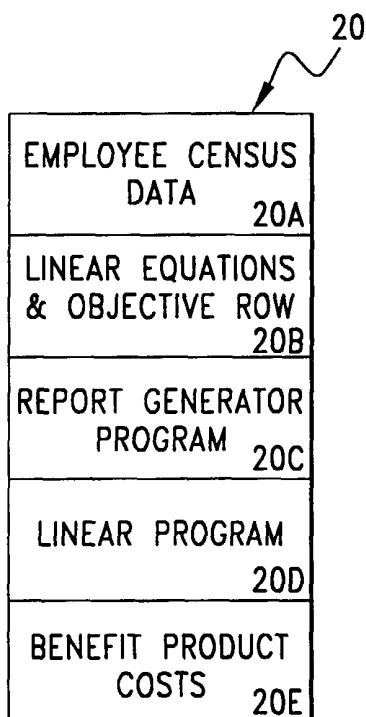
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(54) Title: APPARATUS AND METHOD OF COMPOSING A PLAN OF FLEXIBLE BENEFITS



(57) Abstract: There is disclosed a method and apparatus for devising the financial aspects of a plan of benefits for a given population of employees in accordance with goals set by an employer (154) of the employees. This invention enters data into a memory (20) of a computer system reflective of the employees (20A), the costs of the benefits and the employers goals. Next, variables are defined and entered into the memory (20) reflecting the costs of the benefits, and a set of relationships is constructed of the cost variables in a manner to constrain the cost variables in accordance with the plan benefits, and a set of relationships is constructed of the cost variables in a manner to constrain the cost variables in accordance with the plan of benefits. Finally, the set of relationships is processed in the computer system to provide at least one set of solutions of the cost variables.



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## APPARATUS AND METHOD OF COMPOSING A PLAN OF FLEXIBLE BENEFITS

### Cross Reference to Related Applications

5           The application is a continuation-in-part of U.S. Patent Application Serial No. 08/946,269, entitled "APPARATUS AND METHOD OF COMPOSING A PLAN OF FLEXIBLE BENEFITS", filed October 7, 1997 in the names of Andrew A. Hyman and William R. Jaeger, issued July 18, 2000 as U.S. Patent No. 6,092,047, and incorporated herein by reference.

### Field of the Invention

10           This invention relates to data processing systems and, in particular, to such systems for composing a plan of flexible benefits.

### Background of the Invention

Data processing systems implemented by programmed computers have been used in a variety of different ways with respect to a variety of insurance products and to employee benefits in general.

15           U.S. Patent No. 4,648,037 of Valentino relates to a software system for permitting employees to access information by a terminal connected to that system. The system is capable of displaying on demand the value of their savings plans, withdrawal information, benefit information re the employee's life insurance, disability insurance, vested retirement etc.

20           U.S. Patent No. 4,837,693 of Schotz relates to a computerized system for implementing and administering a group life insurance plan, which has conversion rights. The system gathers employee and employer information and summaries that information to generate and display reports. The system also calculates employee contributions.

25           U. S. Patent No. 5,429,506 of Brophy et al. relates a premium paying corporate life insurance plan with a voluntary employee group life plan. In particular, the system determines the split of premiums between the employer and the employee in a manner to give the employee a death benefit and to permit the employer to invest funds in the cash value of a single life insurance contract.

30           U.S. Patent No. 5,191,552 of Bosco et al. relates to an integrated computer system including a plurality of data processing systems, each system for administering at least one of the underwriting, administration and actuarial functions. The data processing systems are tied to an enterprise-wide relational data base.

U.S. Patent No. 5,590,037 of Ryan et al. relates to a computer system for generating a financial forecast for a life insurance contract, and creating a model or an illustration of a life insurance contract subject to an indenture as a means for prefunding future employee benefits.

5 U.S. Patents Nos. 4,969,094 and 4,750,121 of Halley et al. relate to a system for administering a wide range of insurance activities including enrolling employees, receiving periodic employer payments, investing in securities, receiving death benefits of the enrolled employees, distributing payable benefits, funding those benefits payments by investing those proceeds, and employing life insurance policies with one-year term dividend rider components.

10 U.S. Patents Nos. 5,446,653 of Miller et al. and 5,272,623 of Grubb et al. both relate to a computerized system for putting together select clauses to generate an insurance contract for a particular purpose.

U.S. Patent No. 3,634,669 of Soumas et al. discloses a portable computer to be used by a salesman for determining the insurance requirements of a prospect.

15 None of the above discussed patents relate to the use of a computer system for helping an employer evaluate financial aspects of insurance and other benefits for inclusion in a flexible benefit plan for its employees. The differences and disadvantages of traditional or fixed, as opposed to flexible, benefit plans are well recognized by one skilled with employee insurance and benefit programs. The key distinction is that fixed plans require each employee under that plan to accept a preset package of benefits. However, it is apparent that each employee will have significantly different  
20 needs and wants. Thus, the use of a fixed benefit plan can lead to inefficient spending on the part of the employer, since employees are likely to receive benefits that they don't need or want. In a flexible benefit plan, employees are able to choose the benefits that they need or want. For example: If given the opportunity to choose from a menu of benefits, a 25-year-old single employee may tend to choose a basic health plan and disability insurance. A 37-year-old employee with a family may tend to choose a  
25 "richer" health plan, life insurance, disability insurance, and to fund his/her retirement plan. The 50-year old with grown children may typically choose a health plan, long-term care insurance, and funding for his/her retirement plan. Flexible benefit plans may include some benefits provided as a floor for all employees, such as term life and long term disability insurances.

30 One difference among employees is the family status of each employee. Family status in turn can determine the benefit needs and, in particular, the medical insurance needs of an employee. For example, one employee may be single, another married and still another married with children. In addition to family status, a particular employee may not need a particular health coverage. For example, a married employee may have a spouse who already has a full family health insurance coverage. As a result the needs of that employee are different and, if he or she had the choice, would  
35 elect not to have that potentially redundant health coverage, particularly if the employee could receive a

compensatory allowance for opting "out" of the employer's health coverage. It is contemplated that the employee could use that allowance to fund some other benefit or upgrade a particular benefit as would be more needed by that employee. Thus, there is a win-win situation for both the employee and the employer.

5 Thus, it is evident that the flexible benefits approach permits more efficient use of the employer's benefit dollars, since the employer is no longer spending for benefits that employees may not need or want.

Recent surveys support the concept that employees prefer flexible benefit plans and the opportunity to choose their own unique set of benefits. According to a 1995 Workplace Pulse Survey,  
10 99% of employees say that choice in benefits is important, while 88% say that choice is very important. 63% say that they would be willing to pay more for benefits if they had a choice in selecting those benefits. In a 1994 Workplace Pulse Survey, 38% of employees indicated that they had benefits that they do not need and would not use.

Flexible benefit plans are not new. Many employers, particularly large companies, have  
15 adopted such plans. The drawback particularly for smaller companies is one of cost. Many flexible benefit plans are presently prepared by teams of consultants, accountants and actuaries. Often plan preparation is so expensive that incurring such costs appears practical only to large companies with a large employee base and benefit budget. Recent surveys tend to support such a cost constraint factor. According to a 1994 KPMG Peat Marwick Survey, 69% of the companies with 1000-4999 employees  
20 have flexible benefit plans. On the other hand, according to a 1994 Johnson & Higgins Survey, 4% of companies with fewer than 500 employees have flexible benefit plans.

A primary requirement of any benefit plan, at least from the perspective of the employer, is the ability to control the cost of its benefit plans. In a traditional fixed benefit plan, the employer controlled costs by defining the benefits its employees will receive and shopping the market for the best, reduced  
25 cost benefit products. In a flexible benefit plan, the employer controls costs by defining its contribution or the amount at which the employer will underwrite the benefit plan. For the employer, the ability to control and, in accordance with the teachings of this invention, even to set an exact dollar cost for the entire benefit plan may be a significant motive of an employer to adopt a flexible benefit plan. Another motive may be that by selecting only the products wished or needed, an employee obtains better  
30 perceived value for the employer's, and any of his or her own, funds.

The list of benefits may include at least: point-of-service (POS) medical product, health management organizations (HMO) medical product, Preferred Provider Organization (PPO) medical product, indemnity medical product, staff model HMO medical product, group short and/or long term disability, individual short and/or term disability, sick leave group term life insurance, accidental  
35 dismemberment and disability (AD&D) insurance, group universal life insurance, individual term life

insurance, individual universal life insurance, whole life insurance, spousal or dependent life coverage, a 401(k) or other tax preferred retirement program, defined contribution retirement plan, defined benefit retirement plan, profit-sharing retirement plan, indemnity dental, health maintenance organization (HMO) dental, Preferred Provider Organization (PPO) dental, premium only Section 125 plan (a  
5 mechanism to provide many of the benefits on a tax preferred basis), medical reimbursement Section 125 account, dependent care Section 125 account, vision, prescription drug, prepaid legal, long-term nursing care, hospital income and dread disease.

The complexity of the evaluations needed to compose or structure a flexible benefit plan are apparent. In addition to many different benefits available, plan structuring must also consider different  
10 mixes of benefits as selected by each of the number "N" employees of a given employer, the number "s" of different classes (logical groupings) of employees, the selected employer contribution(s) to each class of employees, and the elections by each of the "N" employees to opt "out" or "down" for a particular benefit. The number of variables to be considered is great and the cost of analyzing them is high, particularly if done by teams of consultants, accountants and actuaries. The above noted  
15 references describe the use of known data processing systems with programmed computers to compose insurance contracts and to report the current status of benefits including terms and coverages to beneficiaries. However at least prior to this invention, computers have not been adapted to the complexities of composing or structuring the financial design of a plan of flexible benefits.

Linear programming is an often used mathematical approach to make business decisions and, in  
20 particular, to develop a model whereby the limited resources of a business are employed to maximize profit. The use of liner programming is described in

"Sets, Matrices, and Linear Programming" by Robert L. Childiss (Prentice-Hall - 1974),  
Chapter 5 - Linear Programming, Chapter 6 - The Simplex Method, Chapter 7 - Duality and Sensitivity  
Analysis, Chapter 8 - Transportation and Assignment Problems, and Chapter 9 - Integer Programming,  
25 pp 140-340. This reference is, however, silent as to the use of linear programming to the various problems of planning a plan of flexible benefits, much less how such techniques could be applied to devise benefit plans.

### Summary

It is an object of this invention to construct a flexible plan of employee benefits in a relatively  
30 short period of time, and, in place of the prior art's reliance on a team of benefit consultants and accountants, employ a programmed computer to define the optimum financial aspects of the benefit plan.

It is a further object of this invention to define a set of goals which this flexible plan should meet and, even further, to prioritize these goals.

It is a still further object of this invention to permit an employee to repetitively set and reset the goals and the priorities attached to these goals and to produce a sequence of solutions of the financial aspects whereby the employer may adopt that plan with those financial aspects best suited for the employer.

5 In accordance with these and other objects of this invention, there is disclosed a method and apparatus for devising the financial aspects of a plan of benefits for a given population of employees in accordance with goals set by an employer of the employees. This invention enters data into a memory of a computer system reflective of the employees, the costs of the benefits and the employer's goals. Next, variables are defined and entered into the memory reflecting the costs of the benefits, and a set of  
10 relationships is constructed of the cost variables in a manner to constrain the cost variables in accordance with the plan of benefits. Finally, the set of relationships is processed in the computer system to provide at least one set of solutions of the cost variables.

In a further aspect of this invention, the determining of the financial aspects of the plan of benefits includes the setting by the employer of goals which the plan should meet. In turn, the goals are  
15 ranked in accordance with a set of priorities determined by the employer. In order to implement these goals, a set of relationships are defined to variously include a first set of the variables indicative of the costs of the benefits and defining the goals to be met by the plan to constrain the cost variables. Further, an objective relationship is defined to include a second set of variables selected from the first set of variables in accordance with the goals. A variable solving program is used to obtain a sequence  
20 of sets of optimum solutions of the amounts of the cost variables, each set of optimum solutions reflecting a different set of priorities.

In a further feature of this invention, employers can repetitively alter the set of priorities, whereby each set of solutions reflects its particular set of priorities.

In a particular embodiment of this invention, the set of relationships includes a set of linear  
25 equations, and an objective row.

In a particular embodiment of this invention, the employer assigns priorities by inserting a plurality of coefficients into the objective row, each coefficient being related to a corresponding variable of the second set and its amount set in accordance with the ranked order determined by the priorities of the employer.

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### **Brief Description of the Drawings**

FIGS. 1A and 1B are respectively a functional block diagram of the computer architecture of a data processing system employed in accordance with the teachings of this invention to compose a flexible benefit plan, and a more detailed diagram of a memory incorporated into the system of FIG. 1A illustrating its various distinct files;

FIG. 1C is a functional block diagram of a network system which permits client to access the benefit composing system over a network such as the Internet;

Fig. 1D is a more detailed diagram of the database incorporated into the network system of Fig. 1C;

5 FIG. 1E is an illustration of a product rule in the form of a matrix used by the database/website server of FIG. 1C to point to a particular benefit product;

10 FIGS. 2A and B are flow diagrams of a computer program executed by the computer shown in FIG. 1 to facilitate the inputting of data relating to a census of present employees of a given employer, the various benefits selected by the employer to be considered in its financial design of a flexible benefit plan, the costs of such benefits and the employee elections with regard to opting "out" or "down" of the various benefits;

15 FIG. 3A and B are a flow diagram of a computer program executed by the computer shown in FIG. 1 for processing that data entered by the program of FIGS. 2A and B and to structure a linear program model comprising an objective row and a corresponding set of linear equations and/or inequalities, whereby a flexible benefit program is devised in accordance with the employer's objectives and priorities; and

20 FIG. 4 is a flow diagram of the linear program executed by the computer shown in FIG. 1 to test the priorities and constraints structured by the program of FIG. 3A and B, to review the resultant plans and, if necessary, to input through the operator changes desired by the employer to the previously selected constraints and priorities.

FIG. 5 is flow diagram which illustrates the downloading of certain employee and product data into the database and is executed upon the database/website server (both shown on FIG. 1C) in preparation for processing data for each new group of employees, i.e., of a particular employer;

25 FIG. 6 is a flow diagram which illustrates the construction of tables of rules for each normalized product and each product in the library of available products and is executed when the database/website server of FIG. 1C is being initialized; and

FIGS. 7A, B and C represent a flow diagram executed on the database/website server of FIG. 1C when each employee signs on the website via one of the client terminals.

30 FIGS. 8A, B, C and D illustrate various webpages that are generated and transmitted to the client terminals to facilitate the exchange of data there between and the selection by an employee of the benefit products for his or her flexible benefit plan;

### Description of the Preferred Embodiment of this Invention

With respect to the drawings and in particular to FIG. 1A, there is shown a data processing system 10, which is programmed to enter and to process data whereby a plan of flexible benefits is devised in accordance with priorities of the employer. The system comprises a control processing unit (CPU) 12, a data display device in the form of a cathode ray tube (CRT) 14, a printer 18, a data input device in the form of a keyboard 16 and a data memory 20. As illustrated in FIG. 1A, the CPU 12 is connected separately with each of the CRT 14, the printer 18, the keyboard 16 and the memory 20. As illustrated in FIG. 1B, the memory 20 is divided into a plurality of distinctly addressable files 20A - 20E for storing specific data and programs therein as will be explained.

In a further embodiment of this invention, the data processing system 10 of FIG. 1A may be employed as a client terminal 10' of a network system 11 as shown in FIG. 1C. When used in such a system, the CPU 12 is connected to a communications interface 22'. In one illustrative embodiment of this invention, the interface 22' could take the form of a modem for connecting each client terminal 10' with a network 24, which may illustratively take the form of the Internet.

Referring now to FIGS. 2A and B, there is disclosed a flow diagram which helps the employer to prepare the financial structure of a flexible benefit plan for its employees, to select the benefit products to be included within that plan, to identify the products included within its old fixed plan, to enter census data for the current population of employees and to enter the cost of the benefit products included within each of the new and old plans, whereby the total costs to the employer of each of the old and new plans may be determined. The total costs of the new and old plans are critical to the employer's evaluation of these plans.

The total costs, as well as the underlying data entered by the flow diagram shown in FIGS. 2A and B, define the values of constants, which are included in a set of linear equations or inequalities. As will be explained, these equations are constraints by which the financial design of the new flexible plan of benefits will be constructed. The data indicative of the total costs and the underlying data is named and structured in terms of certain parameters and fixed constants. For example as explained above, there is a given number "N" of employees for a particular employer. The "N" employees are divided into a number of classes "i" of employees, where "i" varies from 1 to "s" and "s" is the number of classes, illustratively by position in company, geographic location, family/marital status or age band. For example if class is to be determined by family status alone, the number of classes may illustratively be 4 ( $s = 4$ ) and the four classes may include: 1) "single" ( $i = 1$ ), 2) "employee + spouse" ( $i = 2$ ), 3) "employee + child" ( $i = 3$ ) and 4) "family" ( $i = 4$ ). In this class structure, "family" indicates that the employee's spouse and one or more children are also to receive coverage in addition to the employee. The applicable, natural class (i) for an employee reflects the coverage to be nominally provided by the employer based on the present family status of the employee.



Referring now to FIG. 2A, the structuring of a new, flexible benefit plan and, in particular, the entry of employee statistics begins in step 110. Next in step 112, the classes of employees receiving benefits, wherein the costs may be uniform or nearly uniform within each such class, are defined and entered into the data processing system 10. The structure of the classes and a name (or address) for each class are entered in step 112, e.g., via the keyboard 16, to be stored in file 20B of the memory 20. For example, the cost of certain benefits may depend on the age of the employee. Such benefits with unique employee dependent costs, which include for example group life insurance and long term disability, are identified. Next in step 114, the number "s" of classes is analyzed to determine whether the number "s" is sufficiently small to render this analysis practical. A classification scheme such as described above where there are four classes ("s" = 4) ranging from "single" to a full "family" is practical. A scheme in which a spouse and each child constitutes another class and requires another rate may also be practical. Another scheme that may or may not be practical would be a situation in which the rates for each of the four classes just mentioned may be age band dependent, and that there are, as a result, a large number of classes.

If step 114 determines the number "s" to be so large to be impractical, step 116 would devise an alternative scheme that reduces the number of classes. For example, a class may be redefined to include a wider "band" of ages, as opposed to a class defined as that age dependent benefit limited to a single age or a narrow band of ages. To that end, it may be appropriate to obtain from the employer an indication of whether rates may be averaged within each of the four classes. It also would be pertinent to determine whether the employer would make contributions, from which an employee could draw for his/her age-class combination, or would use a weighted average or median value for costs assigned to its employees in a class. In addition, the number of classes may be reduced for the employer to explain more clearly its method of contribution to its employees. In another embodiment, there are a plurality of recognized classes in which benefit rate distinctions are treated by formula or by table for purposes of financial plan design.

Selected of the linear equations include parameters such as the cost for each benefit or product, which is represented by a letter. For example, the cost for health insurance for class i identified by "A<sub>i</sub>", a dental plan by "B<sub>i</sub>", life insurance by "C<sub>i</sub>", etc., as shown in Step 118. The number of employees in each natural class as defined by the actual family status of an employee is "n<sub>i</sub>". In step 118, the cost for each benefit in each class, A<sub>i</sub>, B<sub>i</sub>, C<sub>i</sub> ... E<sub>i</sub>, is determined and entered into the data processing system 10. The benefit rate and cost data entered in step 118, e.g. via the keyboard 16, is stored in file 20E of the memory 20. In this instance, the letters A, B, C referred to above identify the products of the present benefit plan. As will be explained these values will be used to calculate the costs of the present fixed plan and to compare those costs of the fixed plan with respect to the costs of a new plan of flexible benefits as devised in accordance with this invention.

In step 120, a determination or an estimation may be made of the reduction or elimination of certain coverages by each employee and entered into the system. As explained above, an employee may elect in a flexible plan to opt "out" of or "down" from the selection of the benefits offered in the new, flexible plan. For example, consider the medical insurance; the spouse of the employee may receive a richer medical insurance plan covering the entire family or the spouse. Thus, the employee may elect depending upon the independently provided medical insurance of the spouse, to opt "out" of any medical insurance or to opt "down" to receive only the employee-child option from his/her employer. In the contemplated benefit structure, the benefit, e.g., medical insurance, is tiered in steps according to the extent (and cost) of the coverage as follows. The richest, most extensive coverage is provided for the family class. The next most extensive coverage may be for the employee-child class, followed in order by couple and single classes. The employee may be permitted to opt "down" to one of the lower levels of coverage and, even, to opt "out" completely of any medical insurance.

The structure of these reductions may be proscribed by the employer or the law. For example, an employee may be prevented from eliminating a medical coverage unless the employee has an alternate source for that medical coverage.

The employer may encourage its employee to opt "down" and/or "out" by offering monetary incentives in the form of allowances. The amount of the allowance depends on the coverage reduction, i.e., the move from one class of coverage to another and is selected to induce the employee to opt down or out. The employer may wish to poll its employees as to which amounts would be effective incentives to its employees. In this specification, the monetary incentive provided by the employer to its employees to opt "down" or "out" is termed an "allowance" and is identified in the linear equations as ALLOW.

An opt "down" or an opt "out" move generally is an advantage to both of the employer and employee. For the employer, the cost is the monetary allowance, which is the incentive for the employee to accept the coverage reductions. The amount of the allowance is illustratively set such that the employer saves at least the difference between the cost of the coverage in the employee's nominal class versus the reduced cost for the coverage of the new class to which the employee opts to move. Similarly, the employee is ahead by the amount of the allowance plus the lower cost of the coverage (or avoidance of coverage cost altogether if opting out). Design of the linear equations may be facilitated by obtaining either from the employer or, if necessary, polling the employees an estimate of how many employees are likely to opt down or out at a large enough incentive. The structured reductions or moves should not interfere with the solution of the linear equations.

In particular in step 120, an indication for each employee is made as to whether the employee elects a change in the benefit coverage and the nature of that move. Illustratively, the employer may estimate the number of employees who it believes will make a coverage change or may poll its

employees for this information. Also in step 120, data reflecting the present, actual family status of each employee, as well as the election made by each employee as to whether to opt "down" and/or "out", is entered into system 10, to be stored in file 20A of the memory 20.

In step 122, the total cost, as represented by the variable "OLD<sub>T</sub>", for the old, fixed benefit plan and its set of benefit products is determined. As will be described below, the present, total cost for the old benefit plan "OLD<sub>T</sub>" will be compared for evaluation purposes with a variable "COST<sub>T</sub>", which is the total cost of the new, flexible plan. Next in step 124, the number "N" of participating employees in the current census of employees is determined and entered into the system 10. Data reflecting the number "N" of participating employees is stored in file 20A of the memory.

In the next step 130 as shown in FIG. 2B, the component costs of the variable total cost "COST<sub>T</sub>" of the new, flexible benefit plan are determined. First, in step 132, each new product or benefit is separated into 3 categories.

The first category is identified in step 134 as those new or existing products A', B', C', ... E', which are to be included in the new, flexible plan of benefits and also correspond to the products A, B, C ... E of the present fixed plan. Designations A and A' are used to refer to the same or to a comparable product in this evaluation. The cost of these benefits in this first category are to be funded by the employee and possibly by supplemental contributions to be provided by the employer, as will be explained.

In step 136, the second category of products is identified as those flexible benefit products F, G, H ... I which are to be included in the new, flexible plan of benefits but do not correspond to products included in the current plan of fixed benefits. As with the first category of benefits, the cost of these benefits in the second category may be funded by the employee or the employer, or both in combination, as will be explained.

The third category is identified in step 138 as those fixed benefit products J, K ... M which are to be included in the new flexible plan of benefits but which do not correspond to any products included in the current plan of fixed benefits. The products in the third category are mandated and illustratively paid for solely by the employer. There are several reasons why an employer would want to mandate a particular product. For example, an employer may wish to obtain life insurance for the entire group, either as a matter of policy as something every employee should have, or more particularly because certain employees would not be able to obtain individual life insurance because of high risk circumstances. Similarly, a basic long term disability policy may be something an employer feels is appropriate to all employees. Further, costs on such mandated policies, especially long term disability, may be a small fraction of the cost if everyone were to obtain such a policy on a voluntary basis.

After the products are categorized, the program reflects whether the employer elects to make monetary contributions, termed in this instance subsidies, for at least a part of the cost of the products

A', B'... E' and F, G, H, ..., I in the first and second categories, in addition to any other contribution, e.g., the opt "down" or "out" allowances, that the employer may furnish its employees. Illustratively, the employer may give these subsidies to provide monetary incentives to employees to accept selected products in the first category. In step 140, a signal or flag is set as to whether the employer will provide these subsidies to fund, at least in part, the cost of the benefits of the first category. Similarly, step 142 sets a signal or flag as to whether the employer will fund, at least in part, the benefits of the second category. Then step 144 determines the total expected cost  $\hat{a}_c$  to be borne by the employer for selected of the products in the first and second categories. More particularly,  $\hat{a}_c$  is the sum of those contributions made by the employer to its employees, termed herein as "participation cost reductions" for each of the selected products A' to I. As described below, the employer does make other monetary contributions to its employees. These cost reductions reflect the intent of the employer to induce its employees to select certain of the benefits A' to I and, thereby, raise the participation of its employees in certain employer selected benefits. The cost defined above for a particular product for a particular class of employees, e.g.,  $A'_i$ , does not reflect the actual cost of that product for that class, but instead the actual cost for the product less the employer's participation cost reduction. The amount of a particular participation cost reduction may be based on a selected percentage of the actual product cost or a fixed amount which the employer is willing to contribute and the current employee data and, in particular, the decision by each employee as to whether or not to elect one or more of these products. The total cost variable  $\hat{a}_c$  is stored in step 144 for further use. If step 140 indicates that the employer will not fund any of the new or continued voluntary products in the first category, step 146 still saves the costs of the products for analysis purposes, e.g., comparison with cost of the products in the present fixed plan. If step 142 indicates that the employer will not give incentives for any of the voluntary products in the second category, step 148 will discard the cost of the products in the second category. For products in the first category, there are present and new costs for each of the employer and employee (even if zero). These costs are needed for comparison purposes of the present and new plans, i.e., how much better or worse off the employer or employee may be under the new flexible benefit plan. By contrast, those new products in the second category may affect any employer contribution, but do not have any analysis impact on the employees other than in total, the employees will benefit from any employer contribution.

With regard to the third category of benefits, step 150 determines the cost of each new product J, K, ... M, which costs are designated  $J_c$ ,  $K_c$ , ...  $M_c$  respectively, and saves these costs for further analysis. Then in step 152, the program determines the value of each of the products  $J_v$ ,  $K_v$  ...  $M_v$  to each of the employees. For example, an employer may provide a mandated long term disability insurance benefit. There are at least two possible financial values to the employees for such a benefit. One would be that the cost of the long term disability insurance plan to the employer remains unaltered. However, if each individual were to obtain identical coverage on a voluntary basis the cost might be significantly more to the employees. Thus, providing low cost disability insurance may be considered

to have a greater value than the total group cost to the employees. Step 152 calculates the cost or value of the benefits added to the new flexible plan based on the current employee census data including the current number of employees and the new rates or costs for all of the selected benefit products. This cost data realized from step 152, as well as the estimated cost for employer contributions, i.e.,

5 allowances, for employees opting to opt "down" and/or "out" as determined in step 144 and the employee election of certain of the products in the new flexible plan as determined in step 146, are saved in memory for use in further calculations described below.

In FIGS. 3A and 3B, a flow diagram starting in step 154 is shown which permits the employer to select the benefit products for the new flexible plan and to structure the new plan in accordance with the employer priorities as well of those of the employees. In step 156, the employer determines whether the amounts of the allowances to employees for opting "down" or "out" of a particular benefit are to be set by the employer or are to be determined by inserting the allowance parameters ALLOW into the set of linear equations to be solved by the linear program. Illustratively, the election made in step 156 relates to health insurance. If in step 156 the employer elects to set the amounts of the

10 allowances, step 158 permits the employer to set specific amounts for the potential opt "downs" or "outs" allowances ALLOW<sub>1</sub> to ALLOW<sub>6</sub>, which correspond to the illustrative six moves "j" which an employee may make.

In this example, the employee is classified based upon his or her natural family status to one of "s" classes, where "s" = 4. The first class is "family", where the employee is married with children; the second class is "EE + spouse" where the employee is married without children; the third class is "EE + Children" where the employee has children but no spouse, and the fourth class is "EE" where the employee is single. As shown in FIG. 3A, there are illustratively 6 different "down" or "out" moves that an employee may make. If the employee is classified as "family", he or she may opt for one of at least three moves. The first move permits the employee to opt "down" from the "family" coverage to the "EE + children" coverage, whereby the employee receives an allowance ALLOW<sub>1</sub>. The second optional move permits the employee to opt "down" from the "family" to the single or "EE" coverage, whereby the employee receives the allowance ALLOW<sub>2</sub>. The third move permits the employee to opt "out", whereby the employee receives an allowance ALLOW<sub>3</sub>. The fourth move permits the employee to opt "down" from the "EE + spouse" coverage to the single or "EE" coverage, whereby the employee receives the opt "down" allowance ALLOW<sub>4</sub>. The fifth move permits the employee to opt "out" from the "EE + spouse" coverage, whereby the employee receives the allowance ALLOW<sub>5</sub>. The sixth move permits the employee to opt out from the single coverage "EE", whereby the employee receives the allowance ALLOW<sub>6</sub>. Whether the sixth move is available to the employee may depend upon the source of the medical coverage, i.e., the product provider might mandate that a single employee must be

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35 covered by a medical coverage and prohibit this opt "out".

On the other hand if the employer elects in step 156 not to set the amounts of the allowances ALLOW<sub>1</sub>-ALLOW<sub>6</sub>, step 160 inserts the ALLOW<sub>1</sub> to ALLOW<sub>6</sub> variables into the linear equations to be solved by the linear programming. In step 160, in order to make the linear program calculation of the values of ALLOW<sub>1</sub> to ALLOW<sub>6</sub> practical, it may be desirable to break down each of the six moves described above into incremental steps. As an example of such steps, each opt "down" and/or "out" move may include one or more incremental steps from the coverage of one class to that of the next lower class; such a step is represented by the variable ALLOW<sub>t</sub>. A full opt "out" step from single coverage may be represented by the variable ALLOW<sub>o</sub>. A broad range of other options exists.

Then in step 162, based on the employer's estimate of employee or an actual census of the opt "down" and "out" steps, a calculation is made of the opt "down" and "out" allowances generated. If step 158 was applied, then this is the total dollar amount of such allowances. If step 160 is applied and the ALLOW<sub>o</sub> and ALLOW<sub>t</sub> variables used, then the result of step 162 will be a constant times the ALLOW<sub>o</sub> variable plus another constant times the ALLOW<sub>t</sub>; in that situation, the values of ALLOW<sub>o</sub> and ALLOW<sub>t</sub> will be solved for by the linear program.

Quantitatively, step 162 determines the total cost savings to the employer resulting from the employer's election in steps 158 or 160, and from the "downs" and "outs" allowances ALLOW<sub>1</sub>-ALLOW<sub>6</sub>, which were set by the employee in step 120 of FIG. 2A, in accordance with the following equation:

$$\sum_{j=1}^6 \text{ALLOW}_j m_j = \alpha_c \tag{1}$$

, where each of m<sub>j</sub> is the number of employees who have actually made or are estimated to have opted "down" and/or "out", and ALLOW<sub>j</sub> is the allowance for a particular one of the six illustrative moves j. Equation (1) first sums the costs for all of the opting employees m<sub>j</sub> for one of the moves, and then repeats the summation of for each of the potential j moves where j = 1 to 6. Step 160 uses the linear programming to solve for the values of ALLOW<sub>o</sub> and ALLOW<sub>t</sub>. The total contribution for each of the moves "j" is represented by a particular number of the variables ALLOW<sub>t</sub> and a particular number of the variables ALLOW<sub>o</sub>. For example, the amount of the allowance ALLOW<sub>3</sub> for an employee opting to opt out from the family coverage would be represented by 2 ALLOW<sub>t</sub> + ALLOW<sub>o</sub>, i.e., one ALLOW<sub>t</sub> for the move from the family coverage to the employee plus children coverage, another ALLOW<sub>t</sub> for the move from the employee plus children coverage to the employee coverage and one ALLOW<sub>o</sub> for opting out from the employee coverage. The other moves may be similarly expressed. In this embodiment, equation (1) sums all of the allowances ALLOW<sub>o</sub> and ALLOW<sub>t</sub> for all of the moves made by all of the employees; for example, the output of equation (1) might appear as 30 ALLOW<sub>t</sub> plus 10 ALLOW<sub>o</sub>. The use of ALLOW<sub>o</sub> and ALLOW<sub>o</sub> is a good illustration of reducing the number of independent variables and thus producing useful linear programming solutions.

Next in step 164,  $n'_{Ai}$  is defined for each of the classes  $i = 1$  to " $s$ ", as the number of employees in that class after those who have opted "down" or "out" for the benefit product A, i.e. medical insurance, have been deducted. As  $n'_{Ai}$  is the estimated number choosing a class, this is used subsequently for various costing purposes.

5 Then step 166 permits the employer to elect to give or not to give its employees allowances for opting from a set of "outs" or "downs" in another benefit product B, e.g., a dental health plan, in the manner of steps 158 and 160 described above and to accumulate the costs for all of the sets of "downs" and "outs" for product B. It is appreciated that steps 158, 160 and 162 are repeated for each product or benefit of the flexible plan which provides for opting "down" or "out".

10 Next in step 170, a decision is required by the employer as to whether there is to be a relationship of the excess amounts  $EXTRA_i$  provided by the employer to each of the " $s$ " classes for purchase of flexible benefits other than just ranking; in other words, are the relationships between the excess amounts for coverage purchases in different classes to be explicitly provided. If the answer is that the subsidiary relationships are to be explicitly provided between two classes  $i$  and  $j$ , then the  
15 excess amount relationships are defined.

As will be explained below, the employer makes a variety of monetary contributions to its employees, who in turn use these contributions to purchase benefit products as selected by each employee. The employer's principle contribution takes the form of a flexible credit  $FC_i$ , which is defined as that fixed monetary amount for each employee of the " $i$ " class of employees, where " $i$ " varies  
20 from 1 to " $s$ " and " $s$ " is the number of classes. It is understood that there may other contributions made by the employer to its employees as will be explained below. In turn, the excess amount  $EXTRA_i$  is defined as the excess amount of the flexible credits  $FC_i$  which the employer provides to its employees in class " $i$ " over the purchase price of the products A', B', C' ... E' of the new, flexible plan, that match or most nearly match products A, B, C ... E of the employer's current, fixed benefit plan, plus any  
25 contribution that the employee now makes to that current, fixed benefit plan. Step 172 designates that relationship as expressed in equation (2). It should be noted that if the employer desires that the excess amount be equal for all participants, then for all of the relationships between adjacent classes, there is just a single flexible credit FC and a single excess amount EXTRA. In an instance in which the flexible credit FC is fixed, it may be better for the employer to establish the value of the flexible credit FC  
30 directly, since it pertains to the impression of the plan to employees and not to fulfillment of economic objectives. On the other hand, if excess amounts EXTRA are to be provided to different classes, but nothing other than an ordered ranking is specified, then step 174 applies. For all adjacent classes  $i, j$  in such an ordered ranking, it is merely noted that  $EXTRA_i > EXTRA_j$ , where  $i$  is the class desired to receive the higher excess amount and  $j$  the class desired to receive the less excess amount.  
35 Alternatively at the election of the employer, a special or particular relationship can be established in

step 172 between the excess amounts  $EXTRA_i$  and  $EXTRA_j$  for any classes  $i$  and  $j$ . For example, the relationship may be defined by a constant  $K_{ij}$  in accordance with the following formula:

$$EXTRA_i = K_{ij} EXTRA_j \quad (2)$$

5 , where  $EXTRA_i$  is the excess amount to the employees in class  $i$ , and  $EXTRA_j$  is the excess amount in a different class  $j$ , and the constant  $K_{ij}$  defines the relationship between the excess amounts of classes  $i$  and  $j$  of employees. Any relationship other than the multiplicative one of (2) is of course possible.

10 Next as shown in FIG. 3B, the process for permitting the employer to establish its priorities as to the structure and cost of the flexible plan, continues in step 176. The employer enters in step 178 a dollar amount, which the employer sets as a "target" for the cost savings realized by adoption of the new flexible plan over the cost of the old fixed plan. This savings target for the new flexible plan is identified as the variable  $TARGET_T$  and will be included in a set of linear equations, which are explained below.

15 In the contemplated flexible plan, the employer provides a further monetary contribution or flexible credit which is identified as the variable  $FC$ . The variable  $FC$  is that monetary contribution given to each employee. The costs to the employees of the various benefits or products  $A', B'.. E', F ... J, K .. M$  for each employee are then charged against that flexible credit  $FC$ . In addition to the flexible credit  $FC$ , the employer makes the following further contributions to each employee in the form of: a) the allowances  $ALLOW$ , discussed above, for the opt "downs" and/or "outs" which the employee may  
20 elect in step 120, b) the payments to provide incentives or, at least, to partially compensate for undesired class disparities of the present plan, herein both termed subsidies, to the employees who participate in the benefit products of the new flexible plan  $A', B'.. E'$  which were selected by the employer in step 140 and match similar products included in the present, fixed plan and other new products which were chosen by employer in step 142 to be added to the new, flexible plan  $F, G, .. I$ , and  
25 c) for the benefit products  $J, K ... M$  of the new, flexible plan, which were added by the employer as described in step 138. In most instances those mandated products are paid for directly by the employer and do not affect any shortfall or excess of spending by the employee related to the flexible credits  $FC$ .

30 In accordance with this invention, the flexible credits  $FC$  may illustratively be a set dollar amount that is given to each employee, or alternatively may vary for each benefit product  $A, B$ , etc. and/or for each class of employees. In the example described above, the employees were placed in four classes according to being single, employee + spouse (married), employee + children and family. It is appreciated that defining the variable flexible credit  $FC$  for each of the plurality of classes and/or product adds a corresponding variable for solution to the process for setting the benefit funding, the use of which additional variables needs to be justified by the particular needs of the employer. In the  
35 illustrative embodiment shown in FIG. 3B, the employer may simplify the process by setting in step



180 the variable flexible credit FC to be a fixed constant, i.e., a fixed dollar amount will be given to each employee regardless of the class of the employee and against which all benefit products will be charged. If step 180 fixed the variable flexible credit FC, then step 182 enters a particular dollar amount for the constant flexible credit FC. However if in step 180 the employer decided not to fix the flexible credit FC, step 184 does not fix the value of the flexible credit FC, but moves to step 186 where as will be explained, a linear equation is established with at least one variable corresponding to the flexible credit FC.

Next in step 186, a set of relationships are constructed to represent certain financial aspects of the new flexible benefit plan. For example in an illustrative embodiment of this invention, these relationships take the form of the previously discussed set of linear equations, each of which includes variables to define particular financial feature(s) and is used to measure amounts exceeded, or shortfalls of a target set by the employer to constrain that financial feature(s). With regard to shortfalls, each of those is defined as a variable. In particular, step 185 constructs a plurality of linear equations, which constrain, i.e., define, the financial aspects of the new flexible plan of benefits. Prior to this step, the variables have been defined in terms of the various financial aspects of the new plan. Now in an illustrative embodiment of this invention, step 185 selectively incorporates selected of those variables into each of the linear equations (2) and (4)-(11) as discussed herein. As will be discussed below, step 186 selectively incorporates variables used in the linear equations (2) and (4)-(11) into the objective row (3). These variables are selected based on the particular goals of a given employer.

It is in the nature of the structuring of the relationships that prevail here that the number of linearly independent equations is less than the number of linearly independent variables included within these linear equations. For that reason, the power of linear programming becomes apparent by the use of the objective row. The objective row, unlike the remaining linear equations which define constraints, includes a set of coefficients which when multiplied times the respective variables defines a corresponding objective or goal, or multiple objectives or goals, of the employer. Typically, some of the employer's goals or objectives conflict with other goals, and all can not be met with the constraints incorporated into the linear equations. Even if there is not a feasible solution of the set of linear equations that meets all of the employer's targets, these equations may be solved by a linear program to rank the failures to meet each of those targets in an objective (maximizing) row so that the solution satisfies the most critical goal first, the second most critical goal second, and so forth. This feature of ranking the significance of any failure to meet a particular target allows solutions to be examined by the employer in terms of the employer's priorities rather than to treat all such failures on an equal basis, as would be the case if the linear program indicated that a solution meeting all targets was simply impossible.

It is not unusual for the employer to set goals that can not all be met simultaneously. For example, the employer may wish to reduce its costs for its new plan of flexible benefits, while the

employees retain as good benefits as before at no added costs to the employees. It is apparent that, barring any cost savings potential in the plan, these goals conflict with each other and, if incorporated into an objective row, may lead to an infeasible solution consistent with the linear constraints.

In this illustrative embodiment of this invention, the relationships are configured as linear equations or inequalities. A linear equation or inequality by definition includes only linear variables, i.e., there are no variables of a different order than 1, i.e., no  $X^2$ ,  $X^3$  etc. Depending upon the equations or inequalities, there may be no solution, and if there is a solution, there may be only one solution or an infinite number of solutions. A solution is deemed to be infeasible if there is no answer that meets all of the requirements.

In linear programming, the objective row can be constructed that applies a large negative coefficient  $M$  to be multiplied times each corresponding variable that one seeks to have eliminated and a positive coefficient times each of the variable desired to be retained. As a result, the sum of these coefficients times the corresponding variable is forced to become a maximum, subject to the equation or inequality constraints. For example, if there were four different goals of the client, each reflected by an independent variable, then there would be four variables defined to reflect the amount by which each such target was not met. The coefficients associated with the four variables may be represented by  $M_1$ ,  $M_2$ ,  $M_3$  and  $M_4$ . If the coefficients  $M_1 \gg M_2 \gg M_3 \gg M_4 \gg 1$  were numbers of extremely large magnitude relative to the values of such potential shortfall variables, then in the objective row one might assign  $-M_1$  times the shortfall of the most important target,  $-M_2$  times the shortfall of the second most important target, etc. If, subject to meeting all such targets, there were a variable defining the value of the flexible benefit plan to the employer or employee (or two such variables or weighted combination thereof), then that variable or variables would be entered with a positive coefficient or coefficients, equal to the relative weighting of two or more such objectives, in the objective row.

This approach provides the employer an effective mechanism to structure a flexible benefit financial plan to meet its ranked goals from the most to the least important. The employer can easily set and reset, as explained below, these coefficients in accordance with changing priorities to adjust thereby the mix of benefit products and costs thereof, until a plan is developed which meets all of the employer's goals or at least presents a plan which best addresses, in the employer's view, the conflicting goals and priorities of the employer. The contemplated set of linear equations or inequalities may be solved by commercially available linear programming software. Among other options that may be utilized of that software, a solution may be stored and applied to a subsequent revised objective function to determine the value of the earlier solution under the subsequent objective row.

Another feature of linear programming employed by this invention is the display of shadow prices. This mechanism allows the user to see what the impact on the objective row is, if a constraining linear equation or variable thereof were incrementally changed. Thus, for example, if one of the targets

was that the benefit amount contributed by the employer to an employee with family should not exceed the contribution to a single employee by a certain amount, and if a failure to meet that target amount proved to be the most adverse outcome of an optimum linear programming solution, then the effect on that solution of easing the constraint by one unit would be provided.

5           The employer's priorities for structuring the new, flexible plan may be ranked. To effect such ranking, selected of the goals is reflected as explained above as a target variable to be included in the objective row which reflects the failure to meet that goal. As explained above, each target variable has a corresponding one of the coefficients  $M_1$  to  $M_x$ . Illustratively, variables can be defined as: a) the cost increase for the employer of the new, flexible plan over the old, fixed plan; b) the reduction in  
10 employee benefit purchasing power in the new versus the old, fixed plan; c) the excess cost of the new plan over the employer's cost cutting objectives; and d) the disparity between an employee's benefit cost to the employer in the most richly benefitted class versus an employee's cost in the least richly benefitted class.

As illustrated in FIG. 3B, one goal of the employer may be to prevent the total cost of the new, flexible plan from exceeding that of the old, fixed plan. The corresponding variable could be expressed  
15 as the  $ADD_T$ , which would be defined as the added cost of the new, flexible plan over the old, fixed plan. A corollary goal could also be expressed by a different objective variable  $SAVE_T$ , which is oppositely defined as the savings in total cost resulting from the adoption of the new, flexible plan over the old, fixed plan. In step 178, the employer enters the amount of the variable  $SAVE_T$  which defines  
20 the employer's target savings of the new, flexible plan over the old fixed. A second variable  $MISS_T$  may then be defined as the shortfall of meeting the savings target variable  $SAVE_T$ .

A third goal may be defined to reflect the shortfall  $REDEMP_T$  as the sum of the shortfalls of each of the "s" classes that the flexible credits  $FC_i$  and subsidies  $ER_i$  for all products as contributed by the employer for the new plan of flexible benefits, fails to match that sum for the old, fixed benefit plan.  
25 In any given class, this shortfall per employee is multiplied times the number of employees in that class. The sum of these shortfalls is defined as the variable  $REDEMP_T$ .

A fourth goal may be defined to reflect the failure to keep the differential in the value of benefit products given to one class "i" of employees as compared to another class "j" below a prescribed value. Illustratively if the employer wanted benefit values over all classes to be equal, an objective variable  
30  $DISP_{MAX}$  could be defined as the greatest difference in the employer contributions, i.e, subsidies and flexible credits  $FC$ , to one class and the total of such contributions to another class.

A fifth goal may be to maximize the total added value of the new benefits plan with respect to that provided by the old, fixed plan. Such an objective variable could be represented as  $ADDEMP_T$ .

After the linear relationships (2) and (4)-(11) are constructed in step 185, selected of the  
35 variables as appear in the above noted linear equations are incorporated into the objective row (3) as set

out below. The employer initially selects a set of the variables in step 186 based on a corresponding set of goals. Above there are illustratively enumerated 5 goals, one for each of the variables to be incorporated into the objective row (3). Significantly, these goals are selected by the employer as, at least in the first instance, the goals for the employer's plan of flexible benefits. As will be explained below, the employer can change these variables in step 198 to reflect new and different goals, if the solutions of these rows (2)-(11) as obtained in step 198 do not satisfy the employer.

In an illustrative embodiment of this invention, the objective row is composed of the above discussed objective variables as follows:

$$-M_1 \times ADD_T - M_2 \times REDEMP_T - M_3 \times MISS_T - M_4 \times DISP_{MAX} + ADDEMP_T \quad (3)$$

The objective row (3) does not include an equal sign, because it is the object of this process to maximize the sum of the variables of this row (3). Alternatively, the output of the objective row (3) could be minimized if the negative coefficients - M were replaced with positive coefficients + M. In the above described illustrative embodiment, it is

desired to maximize the sum of the objective row as shown in equation (3). The use of linear programming permits the inclusion of the coefficients "M" into the objective row to reflect the priorities of the employer. In the process of this invention, the employer is able to prioritize the objective variables included in the row (3) in any desired order by the use of the negative coefficients M. Each of these negative coefficients M is associated with its selected objective variable to prioritize that objective variable. The lower or more negative a coefficient M is, the higher the employer's priority. In an illustrative embodiment, the value of the coefficients M are set such that the top priority objective is fully satisfied, before the second priority objective; no subordinate objective is partially or fully satisfied in preference to a higher ranking objective. Alternatively, weighted objectives can be reflected in an objective row through the use of appropriately assigned coefficients.

In row (3) above, the highest priority is illustratively awarded by the employer to prevent the cost of the new, flexible plan from exceeding that of the old fixed plan, which is expressed as  $ADD_T$  and is associated with the negative coefficient  $M_1$ . The second highest priority is awarded to any decrease  $REDEMP_T$  in the value of the benefits of the proposed new plan from that of the present plan of fixed benefits and is associated with the negative coefficient  $M_2$ . The third highest priority is awarded to the shortfall  $MISS_T$  of meeting the savings target of the new flexible benefit plan. The fourth highest priority of the objectives of row (3) is the disparity  $DISP_{MAX}$  between benefits provided the most richly rewarded and least richly rewarded classes. Finally, the lowest priority of the objectives is the total increase or value added to the cost or value of the benefit products  $ADDEMP_T$  included in the new flexible plan over the value of the products of the old, fixed plan and is associated with the positive coefficient 1.

Thus in accordance with the teachings of this invention, the employer will be permitted as described below in detail to change priorities and, in particular, to alter priorities by at least selectively changing the order or the negative coefficients applied to each of the objective variables. It is also contemplated, as explained below, that the illustrative objective variable included within the row (3) may be varied. For example, selected of the objective variables could be deleted and/or new variables as indicative of certain other objectives to be achieved by the new flexible plan included. For example, the objective variable  $SAVE_T$  as defined above could be added to row (3) with a positive coefficient, if an employer wanted more savings beyond the desired target  $TARGET_T$ . Further, the employer may wish to impose a different penalty on the variable  $SHORT_i$  in each class  $i$ , i.e., the amount by which an employee must pay more for benefits than before, if indeed variable  $REDEMP$  can not be eliminated in the optimal solution; doing so can skew such shortfalls in or against the direction of one class or another. These are simply illustrative and are not meant to be all-inclusive of the possible variations in an objective row (3).

It is also of course possible to vary some of the variables based on the result of a linear programming analysis. If, for example, the amount by which savings missed the target  $MISS_T$  in (3) were relatively small, the employer might not be insistent on an exact satisfaction of his savings target and be willing to reduce that target by amount of the variable  $MISS_T$  in the on-going analysis. In fact, a key attraction of this approach is the ability to be iterative in arriving at a solution satisfactory to the employer. Criteria originally given may be changed by the employer as the results become apparent in the course of reviewing the results of the linear programming.

An illustrative set of linear equations or rows are structured in accordance with the teachings of this invention. In the following, a set of linear equations will be structured. For each class  $i$  from 1 to " $s$ ", a linear equation may be expressed as:

$$FC_i - EE_{Ai} - EE_{Bi} - \dots - E_{Ei} - EXTRA_i + SHORT_i = 0 \quad (4)$$

, where the variables of the equation will now be defined. The flexible contribution  $FC$  is defined above as that monetary contribution made by the employer to offset fully or partially the cost of the new, flexible benefit plan and may be either a fixed amount or a variable one to be solved. In step 180 above, the employer sets the flexible contribution  $FC$  as either a fixed constant or a variable to be solved with the set of linear relationships. For the purpose of illustration,  $FC_i$  is defined as that fixed monetary amount for each of the " $s$ " classes " $i$ " of employees, where " $s$ " equals four, i.e., there are four classes of employees. Thus, there would be four equations, one for each class, similar to that of equation (4). The variable  $EE_{Ai}$  is the amount which an employee in class " $i$ " must pay for the benefit product A, after the employer has contributed its allowance and/or subsidy contribution to the employees, if any, that would reduce the employee's cost to purchase that benefit. Note that there are similar variables for each of products B', C' ... E' of class " $i$ ".  $EXTRA_i$  is the excess amount by which

the flexible credits  $FC_i$  provided by the employer to buy the benefit products A', B', C' ... E' of the new, flexible plan in class "i", exceeds the employer's contribution that is required to buy the corresponding or most nearly corresponding benefit products A, B, C ... E in the employer's current, fixed benefit plan, after any employee contributions to that fixed plan have been made.  $SHORT_i$  is the amount of the  
 5 shortfall which each employee in class "i" must pay for the new, flexible plan if wishing to obtain such benefits A', B', C', ... E'. Thus in words, equation (4) means that the employer's flexible credits FC to its employees in a particular class less the amount  $EE_{Ai}$  an employee in that class pays for the health insurance product A' less the amount  $EE_{Bi}$  the employee in that class pays for a dental insurance product B' less the amount  $EE_{Ci}$  that an employee in that class pays for any other benefit products C' etc. less the  
 10 extra amount  $EXTRA_i$  an employee in that class pays if buying all of these previously mentioned benefit products A', B', C' etc. plus the amount  $SHORT_i$  the employee in that class must make up if buying all of these previously mentioned products in the new flexible plan, must equal zero.

A second set of "s" linear equations may be expressed for each of the classes i of each of the products A', B' ..E' as:

15 
$$EE_{Ai} + ER_{Ai} - A_i = 0 \tag{5}$$

, where benefit products A' for example is the core health plan,  $EE_{Ai}$  is as described above the cost which an employee in class "i" is charged for benefit product A',  $ER_{Ai}$  is defined as the employer's subsidy in class i for the product A', and  $A_i$  is the cost of the benefit product A' in class i to be paid to its provider. Since there are four classes in this example, there would be four equations for the benefit  
 20 product A and four similar equations for each of the other products B, C, etc. Verbally, each of the equations modeled after equation (5) means that what an employee is charged for a particular product A', B', C' etc. plus what the employer contributes for a particular product less the cost of that product equals a zero.

The following linear equation defines the total cost of the new flexible plan to the employer as:

25 
$$COST_T - \sum n'_i FC_i - \sum_{PRODUCT\ i=1}^s n'_{PRODUCT\ i} ER_{PRODUCT\ i} - ALL\ \alpha_c\ \beta_c\ J_c\ K_c\ \dots\ -M_c = 0 \tag{6}$$
  
 A', B', etc.

, where  $COST_T$  is the total cost paid by the employer for all of the benefit products of the new, flexible plan, "N" is the total number of employees,  $n'_i$  is the number of employees in class<sub>i</sub> after the  
 30 number of employees which opted down or out have been deducted, flexible credit  $FC_i$  is the monetary contribution made by the employer for each employee in class<sub>i</sub>,  $n'_{PRODUCT\ i}$  is the number of employees in a particular class "i" as related to particular product after deducting therefrom the number of employees which have opted "down" and/or "out",  $ER_{PRODUCT\ i}$  is the employer subsidy for the cost of  
 35 a particular benefit product A', B', C' etc. for each of the "s" classes "i" (4 for example),  $\hat{a}'_i$  is, as

explained above, the expected total cost of all "participation cost reductions" contributed by the employer to induce employees to take a particular product or set of products, (e.g., for such instances in which a minimum participation is required), "ALL  $\acute{a}_c$ " is the sum of all of the allowances given to the employees for opting "down" and/or "out", and the costs of the new mandated benefit products J, K, M etc. for the new flexible plan are respectively represented as  $J_c$ ,  $K_c$ ,  $M_c$  etc. In words, equation (6) means that the total cost "COST<sub>T</sub>" less the sum of all employee flexible credits for each class and product, less the sum over all of the products A', B', C' etc. and of the classes "i" of the product of the number of employees "n<sub>i</sub>" after those opting "out" and/or "down" and the employer contribution  $ER_{PRODUCT_i}$  for a particular product in a particular class. less inducement subsidies, less the sum of all of the allowances given by the employer for the opt "outs" and/or "downs" taken by the employees, less the costs paid for by the employer for the mandated products J, K, etc., equal zero.

The following linear equation showing the relationship of the costs for the new, flexible benefit plan and the old, fixed plan may be expressed as follows:

$$COST_T + SAVE_T - ADD_T - OLD_T = 0 \tag{7}$$

, where COST<sub>T</sub> is defined above, SAVE<sub>T</sub> is the savings to the employer between the current, total employer cost of the new, flexible benefit plan over the total employer cost of the old, fixed plan, ADD<sub>T</sub> is the total added cost of the new, flexible benefit plan over the total employer cost of the old, fixed plan, and OLD<sub>T</sub> is the total cost to the employer of the old fixed plan. In words, equation (7) means the total employer cost COST<sub>T</sub> for the flexible plan, plus the total cost savings SAVE<sub>T</sub> to the employer for the total cost of the new, flexible plan over the old fixed plan, less the total added cost ADD<sub>T</sub> of the new, flexible plan to the employer over the present, fixed plan, less the total cost OLD<sub>T</sub> to the employer of the present, fixed plan equals zero.

The following linear equation defines the employer savings SAVE<sub>T</sub> for the new flexible plan over the old fixed plan as follows:

$$SAVE_T - TARGET_T + MISS_T \geq 0 \tag{8}$$

, where SAVE<sub>T</sub> is defined above, TARGET<sub>T</sub> is the target set by the employer in step 178 for the employer's savings in the total cost of the new flexible plan over that cost of the present, fixed plan, and MISS<sub>T</sub> is the amount that the total cost of the new, flexible plan missed or exceeded that total cost of the old, fixed plan. Equation (8) means that the amount of the employer's savings SAVE<sub>T</sub>, less the employer's target savings TARGET<sub>T</sub>, plus the amount MISS<sub>T</sub> that the targeted savings fell below the actual savings will be greater than or equal to zero. Since the variable MISS<sub>T</sub> is a measure of how much the employer has failed to meet its goal, it is included in the objective row (3) where the amount MISS<sub>T</sub> is minimized in accordance with the priorities set by the employer. If the amount saved by the employer SAVE<sub>T</sub> exceeds the employer's targeted savings TARGET<sub>T</sub>, then the inequality will hold, and the amount by which the actual savings falls below the targeted savings MISS<sub>T</sub> becomes 0.

The following linear equation determines  $DISP_{MAX}$  as follows:

$$DISP_{MAX} - \underset{i \text{ over } S}{GREATEST} (FC_i + \sum_{PRODUCTS} ER_{PRODUCT_i}) - \underset{j \text{ over } S}{LEAST} (FC_j + \sum_{PRODUCTS} ER_{PRODUCT_j}) = 0 \tag{9}$$

The variable  $DISP_{MAX}$  is defined above as the dollar disparity between the class<sub>i</sub> with the greatest sum of  $FC_i$  plus employer subsidies and the class with the least sum of  $FC_i$  plus employer subsidies. In an illustrative embodiment of this invention this variable  $DISP_{MAX}$  may be included within the objective row (3) with a penalty coefficient  $M$  assigned to that variable. It is also appreciated alternatively, that an employer may want to assign disparities between classes, or to make disparities between successive classes equal. As defined above,  $ER_{PRODUCT_i}$  is the employer subsidy for one of the products A', B', C' etc. for a particular class "i". Verbally expressed, equation (9) means that the greatest disparity  $DISP_{MAX}$  less the sum of the employer costs for subsidies and flexible credits for all products  $ER_{PRODUCT_i}$  for the most richly benefitted class, less the sum of the employer cost for subsidies and allowances for all products for the least richly benefitted class, equals zero. If there were a single flexible credit  $FC$  for all employees, then the disparity  $DISP_{MAX}$  simply becomes the difference in the sums of the subsidies of the most richly benefitted and the least richly benefitted classes.

The following linear equation determines as follows the variable  $REDEMP_T$  which is defined above as the total reduction in the coverage provided by the new flexible plan over all of the classes:

$$\sum_{i=1}^s n_i' SHORT_i - REDEMP_T = 0 \tag{10}$$

, where  $SHORT_i$  is defined above as the deficiencies in one of the "s" classes "i" which an employee must pay for the benefit products of the new, flexible plan over that which the employee paid for the products of the old, fixed plan. In words, equation (10) means that the sum for all of the "s" classes "i" of the product of the deficiencies  $SHORT_i$  which the employees must pay and the number " $n_i$ " of employees in a class after opting down or out, less the total reduction in employee benefits  $REDEMP_T$  equals zero. As indicated above the variable  $REDEMP_T$  may be included within the objective row (3) and assigned a penalty coefficient.

The eighth linear equation determines as follows the variable  $ADDEMP_T$  which is defined as the added value of the new flexible program over that of the old fixed plan:

$$ADDEMP_T = \sum_{i=1}^s n_i' EXTRA_i - \sum_{i=1}^s n_i' SHORT_i + \sum_{i=1}^s \alpha_c + \beta_c + J_c + K_c + .. + M_c + COSTRED + \sum_{PRODUCTS \text{ A',B',...E'}} \sum_{i=1}^s (n_i' - n_i) \times EE_{PRODUCT_i} \tag{11}$$



In words, the total added value  $ADDEMP_T$  to the employees of the coverage of the new flexible plan equals the sum over each of the "s" classes "i" of the product of the amount  $EXTRA_i$  that the employer allowed extra for spending in excess of that amount for the current fixed plan and the number  $n_i'$  of employees in a particular class "i" after the number of employees which have elected to opt "out" or "down" have been subtracted, less a similar sum over each of the "s" classes "i" of the product of the shortfall  $SHORT_i$  in the flexible credits FC provided for the employees over the costs to the employees for the new products corresponding to the products of the present fixed plan, plus the sum  $\acute{a}_c$  of all of the allowances which the employer has allowed for all of the opt "downs" and/or "outs" elected by the employees, plus the estimated sum of all employer furnished subsidies and participation cost reductions that encouraged employees to choose particular products, plus the sum of the added value of the new mandated benefit products J, K .. M which are paid for by the employer (without effecting the opt down/out allowances further provided to the employees), plus  $COSTRED$ , which can be any other benefit not recognized elsewhere (e.g., a cost savings in mandated versus voluntary long term disability, or an incentive not available before to the employees in their 401(k), plus the sum over all of the products A', B' .. E', which are elected in steps 140 and 142 to receive credits for opt downs/outs and over all of the "s" classes of the product of the difference between the number of employees  $n_i'$  participating in the old, fixed plan and the number of employees  $n_i$  participating in the new, flexible plan (with the number of opting employees deducted) and the employee costs  $EE_{PRODUCT_i}$  for the elected benefit products. As shown above, the variable  $ADDEMP_T$  is added to the objective row (3) and a priority coefficient of + 1 is associated therewith in the objective row; in this illustrative embodiment, maximizing quantifiable benefits to the employees is the key goal once employer prioritized goals are fulfilled to the greatest extent possible. Clearly other objectives are possible, at the discretion of the employer.

As the linear equations or relationships (4)-(11) and objective row (3) are formulated as described above, they are stored in file 20B of the memory 20. After these equations have been structured, step 190 as shown in FIG. 4 solves these equations and inequalities using linear programming to determine the maximum value of the objective row, subject to the constraints of these eight illustrative types of linear equations or groups of linear equations. Illustratively, there are a number of available software products, which will solve the linear equations (4)-(11) and maximize (or minimize) the output of the objective row (3). For example, commercially available programs, which will solve the above equations (3)-(11), include MPL™, GAMS™, OMNI™ and many more programs. One of the aforementioned linear programs may be downloaded into file 20D of the memory 20. For example in the embodiment where the output of the objective row is maximized, the corresponding values for the other variables of the equations (3)-(11) define the costs of and other relationships in the benefit financial plan and determine the details of that plan, e.g. cost, whereby the employer may

review that plan and determine whether this particular financial plan satisfies the employer's priorities and goals.

Though in the illustrative embodiment described herein the relationships are expressed in terms of the objective row (3) and the linear equations (4) - (11), it would be appreciated by one skilled in this technology that other constructs which may be employed to express these relationships. Similarly, one skilled in this art could employ other mathematical techniques for solving the relationships as described above in a manner that would optimize the values of the variables and/or to prioritize which variables as included within these equations are deemed to be the most important in constructing a particular benefit plan with the desired financial aspects. In this regard, it is appreciated that the computer as shown in FIG. 1 is particularly adapted to be programmed with different software to solve optimally these relations and to repeatedly provide solutions which reflect different priorities of the employer.

Each of the above noted linear programming software packages is capable of solving the rows (2) - (11) to provide values of the variables for each of the available solution or solutions, assuming that a solution is feasible. Typically, this solving software provides a set of values for the variables explained above; in particular, the printer 16 and/or the CRT 14 provide a display of these values for the employer's review. For example, the monetary amounts of the following variables are displayed in a format useful to the employer:  $EE_{Xi}$  - the amount an employee in class  $i$  must pay for product  $X$ ;  $ER_{Xi}$  - the amount the employer must underwrite for product  $X$  in class  $i$ ;  $X_i$  - the total of  $EE_{Xi}$  and  $ER_{Xi}$ ;  $EXTRA_i$  - the amount the employer allows for extra spending for the new plan of flexible benefits over that paid for the present plan of fixed benefits;  $SHORT_i$  - the amount of the shortfall the employee in class  $i$  must pay for base benefits;  $ADD_T$  - the added cost to the employer for the new plan;  $DISP_{MAX}$  - the largest disparity in monetary units between that class receiving the richest value of flexible benefits in the new plan and that class receiving the least rich value of flexible benefits, along with its variables in equation (9) and also the disparities between benefits for other pairs of classes;  $REDEMP_T$  - the total added value in monetary units of the new plan as compared to the present benefits;  $COST_T$  - the total cost for the employer of the new plan of flexible benefits along with its component variables in equation (6);  $TARGET_T$  - the targeted saving to the employer for the new plan of flexible benefits;  $MIST_T$  - the shortfall of the actual cost of new plan from  $TARGET_T$ ;  $ADDEMP_T$  - the added value of the new plan over the old, along with its component variables in equation (11), many of which have already been indicated above;  $\hat{a}_c$  - the sum of the opt "down" and "out" allowances, along with component calculations;  $\hat{a}_c$  is the total of the participation cost reductions paid for by the employer to encourage employee participation in certain selected benefit products;  $ALLOW_j$  and  $m_j$ , where  $j$  goes from 1 to "s"; and the other cost relationships shown in equation (8).

There are several different mechanisms, or algorithms, available by which a linear program may solve rows (2) - (11). In accordance with several such mechanisms, first an answer is sought whereby all of the constraint rows (2) and (4) - (11) are satisfied, regardless of impact on the objective

row (3). Then, the values of certain variables are changed and the effect on the output of objective row (3) is observed. Once a feasible solution to the equation (2) - (11) and its solution envelope are found, then values dictated by that envelope are developed for the next solution of these equations. Similar successive solutions are made until no further improvement can be obtained. At that point, the above  
5 noted values for the last solution are the optimum values and are displayed for employer review.

As explained above, the values of the negative coefficients  $M$  are set to ensure that a solution or solutions are reached which will give priority to the various target variables employed in the objective row (3) in that hierarchical order determined by the magnitude of the coefficients, i.e., the greater the magnitude of the coefficients the higher the priority of the target variable to which a particular  
10 coefficient is assigned. As also noted above, the values of the coefficients  $M_1$ ,  $M_2$ ,  $M_3$  and  $M_4$  are selected such that a given coefficient is at least an order of magnitude greater than the next lower coefficient in the hierarchical order, e.g.,  $M_1$  is at least an order of magnitude greater than  $M_2$ .

Setting the magnitudes of the row coefficients in this manner ensures that the linear programming will drive the solution of the linear equations (2) and (4) - (11) in an orderly fashion  
15 which will establish hierarchical priority of the target variables of the objective row (3). The employer selected priority is achieved in the solution of these equations by eliminating preferentially the objective variable of the highest priority over the variables of lesser priority. In the illustrative embodiment of the objective row (3), the  $ADD_T$  variable is selected to be the highest priority and is eliminated first. The most important priority to the employer in this illustrative embodiment is that the  
20 cost of the new plan of flexible benefits will not exceed that of the present fixed plan. It will be appreciated that this priority is met when the difference between the cost of the present plan less the cost of the new plan is greater than or equal to zero. Thus in the course of solving the rows (3) to (11), the  $ADD_T$  variable, i.e., the variable of highest priority, is said to be eliminated when this variable is eliminated or, in other words, the cost difference represented by this variable is reduced to zero, i.e., the  
25 cost of the new plan becomes less than or equal to the cost of the present plan. The objective variables of a lesser priority, i.e., those objective variables associated with the negative coefficients  $M_2$ ,  $M_3$  and  $M_4$  as included within the objective row (3), may be eliminated subordinate to the elimination of the variable of the highest priority.

Setting the values of consecutive negative coefficients  $M$  to differ from each other by at least  
30 an order of magnitude greater, seeks to ensure, if possible, that a variable in the objective row (3) of a greater priority may be eliminated before the linear programming eliminates any objective variable of a lesser priority. For example if the present coefficients  $M_1$ ,  $M_2$ ,  $M_3$  and  $M_4$  were replaced respectively by  $4M$ ,  $3M$ ,  $2M$  and  $M$ , where  $M$  is a common, large number, the difference between consecutive coefficients may be less than an order of magnitude and the linear programming would seek to solve the  
35 set of rows (2) to (11) in a manner that the program calculates two or more variables reflecting undesired goals in relative proportion to each other, one variable to another. The outcome of

processing an objective row with such coefficients was that a unit of the objective variable of the second highest priority was deemed to be 1.5 (3/2) times as valuable as a unit of the objective variable of the third highest priority. This was not a desired result. Rather, it was desired that the linear processing eliminate an objective variable of a high priority completely before the linear processing begins to process any objective variable of a lesser priority. The setting of the difference between consecutive negative coefficients  $M$  to be at least an order of magnitude ensures that the linear processing handles only one objective variable at a time, i.e., it operates to eliminate the remaining objective variable of the highest priority before processing a lower priority variable.

As noted above, linear programming is used to solve the set equations (2) and (4) - (11) in a manner to maximize the output of the function or objective row (3). It is appreciated that the equations (2) and (4) - (11) define a multi-dimensional space. Further, all of the feasible solutions of these equations lie within this space and that the optimal solution, i.e., that solution which will maximize the output of the objective row (3), lies on the envelope of that space. In a common procedure, the first step is to obtain any feasible solution of the equations (2) and (4) - (11). Next, a solution of these equations which lies on the envelope is sought. The remaining processing is to move along this envelope and to reiteratively place values of variables which will continue to maximize the objective row. The direction along the envelope is selected which continues to obtain in the present solution a larger value for the objective row (3) than that obtained in the previous solution. When it is no longer possible to increase the value of the objective row (3) by moving in any direction along the envelope, linear programming has produced the single optimal solution of the equations (2) and (4) - (11). When the optimal solution has thus been found, step 190 is complete and then step 192 displays the solved values for the variables resulting from the optimal solution for the employer's review.

It is expected that as linear programming drives the sequence of feasible solutions towards the optimal solution, that one or more of the variables associated with the negative coefficients in the objective row (3) may be reduced to zero as described above. It is not expected that all of the adverse variables in the objective row (3) will necessarily disappear when an optimal solution is found for the equations (2) and (4) - (11). Even so, linear programming and the use of the negative coefficients provide an effective mechanism to demonstrate the extent to which the various objective variables, often in direct to competition with each other, e.g., the variable  $ADD_T$  as indicative of added cost to the employer for the new plan versus the variable  $ADDEMP_T$  as indicative of the added value of the new plan to the employees, may be met.

In this illustrative embodiment when linear programming is used to solve the rows (2) to (11), the variable  $DISP_{MAX}$  which indicates the maximum difference between the mostly richly benefitted class and the least richly benefitted class coverages may be reduced as desired, but the resulting employee payments  $EE_{A_i}$  and  $EE_{A_j}$  to be made respectively by the employees in the most and least richly benefitted class for product A might be out of balance. In the interest of fairness to different

classes of employees, the employer may wish to maintain certain differences between certain variables, e.g., the costs of medical insurance to the family employee  $EE_{Ai}$  and to the single employee  $EE_{Aj}$ . It is appreciated that the cost of family coverage of medical insurance is greater than corresponding single coverage and that the family employee should pay more than the single employee. To establish at least

5 a minimal difference in payment  $L_{ji}$  between the employees in the classes  $i$  and  $j$  for product A, the following equation may be added to the set of equations (2) and (4) - (11) discussed above to be solved:

$$EE_{Ai} - EE_{Aj} \geq L_{ji} \quad (12)$$

, where the employer can set the variable  $L_{ji}$  to a particular dollar amount. Similarly, other constraints may be readily added to the above set of rows (2) - (11), when other concerns may appear.

10 Linear programming indicates whether a particular parameter is actually binding, by the absence of a "slack" in the objective row (3) of an optimum solution. If it is zero, the parameter can be binding. Consider for example that when variable  $L_{ji}$  is set to be \$300 or greater, the row including this parameter had a zero slack in the optimum solution. A non-zero shadow price and a slack of zero in equation (12) implies that to ease the constraint, that the variable  $L_{ji}$  must be less than or equal to

15 \$300.00 and would cause an increase in the value of the objective row (3). Linear programming as described above can also indicate the largest number for the variable  $L_{ji}$  that can be set without adversely effecting the solution of the objective row (3), through its reporting of ranges and shadow costs.

20 Still referring to FIG. 4, step 190 outputs a set or sets of the solutions of the variables and the objective variables which provide an optimum answer or a set of the best available values for the equations (2)-(11). In step 192, the set or sets of variable values are displayed on any of the well known displays such a CRT or television display. Similarly, these set or sets of variable values are transmitted in step 200 to a report generator, which prepares a report designed for the employer and/or the employees. Illustratively, a report for the employer would include:

- 25 (1) values for each of the target variables which the employer has specified (such as the four used illustratively in the objective row 3) in highest to lowest priority and whether the target has been met; if not, by how much it has been missed;
- (2) the added value of the benefit package to the employees; and
- (3) the costs and values of all variables included here, arranged in sequence assessed to be of
- 30 greatest to those of least interest to the employer, along with a verbal statement as to the meaning of each such particular variable.

Certain of the outcomes discussed in the third paragraph above (and in the first paragraph as well, depending if (1) were to have some class specific objectives) would often be displayed by classes

side by side, so the employer could assess the degree of satisfaction within and across classes of its priorities.

The previously mentioned, and other, linear programming software products include variously (a) report writers associated with them or the (b) capability of generating a file to be read by a data base system such as Access™ or a spreadsheet system such as Excel™ that in turn can be used as a report writer. There are also a number of report writer software systems that can be linked to a wide range of file sources. Such a report generator program is retained in file 20C of the memory 20. The objective of taking the numerical data and converting it into narrative with or without graphs or charts can be achieved by any of those approaches.

Next in step 194, the report provided by the report generation step 200 is reviewed by the employer to determine whether this plan best meets the employer's objectives. If the employer is satisfied with the flexible benefit plan reported in step 200, the employer enters in step 196 an input indicating that the employer does not wish to change the program and the processing described above is terminated. On the other hand if the employer is not satisfied with the last report generated in step 200, it so elects in step 196 and continues to step 198 wherein the employer initiates the desired changes to its flexible benefit program. Generally, step 198 permits the employer to change its priorities, the amount of the target parameter values, constraints and/or add new constraints in the form of linear equations with the present or new variables. One of these possible approaches is to change the value assigned to a particular penalty coefficient to reflect the reordered priorities assigned to the employer's flexible benefit plan and, in particular, to the related coefficient in the objective row or constraint in one of the equations or groups of equations. For example if after reviewing the printout of the last generated flexible plan, the employer might upgrade the priority of leveling the employee flexible credits FC or the employer's subsidies and/or allowances to each of the classes of its employees. The leveling goal is represented by the objective variable  $DISP_{MAX}$ . Also, the employer may wish to downgrade or upgrade its goal of achieving a specified savings in the cost of the new, flexible plan with respect to the old, fixed plan. The cost savings goal is represented as explained above by the objective variable  $MISS_T$ . According to this invention, these goals may be reprioritized by changing the hierarchy of the negative coefficients  $M_I$  to  $M_X$  in the objective row (3). For example, the negative coefficient related to the objective variable  $DISP_{MAX}$  is changed from  $M_4$  to  $M_3$ , and the negative coefficient related to the objective variable  $MISS_T$  is changed from  $M_3$  to  $M_4$  as they would now appear in the objective row (3). Steps 190-200 may be repeated with a different sets of goals and/or revised targets until one or more satisfactory flexible plans are generated.

Priorities may be changed in another way. New measures or objective variables may be introduced in the objective row (3) in accordance with the teaching of this invention. For example, although the variable  $DISP_{MAX}$  was used in equation (9) and in the objective row (3) as earlier described to minimize the difference between the greatest and the least richly rewarded class (as reflected by the

sum of ALLOW plus  $\sum ER_j$ ), certain employer objectives may not be met by the use of this variable. A difference between one specific class and another specific class may be a greater concern than a difference in another paired combination. Accordingly, the variables  $DISP_{ij}$  could be defined similar to that of equation (9) as follows:

5

$$DISP_{ij} = ALLOW_i + \sum_{PRODUCTS} ER_j - ALLOW_j - \sum_{PRODUCTS} ER_i \quad (13)$$

10 The new  $DISP_{ij}$  would be inserted into the objective row (3) and assigned to a different penalty coefficient M in accordance with the relative priority of such differences.

In the above described embodiment, the variable  $TARGET_T$  was defined as a target, i.e., the total savings to be realized by the employer adopting the new, flexible plan as compared to the old, fixed plan. In step 178, the employer set a dollar amount for this target, i.e., a constant was set. (Similarly in the above described embodiment, the targets  $DISP_{MAX}$  and flexible credit FC were set as constants.) In an alternative embodiment of this invention, these and other targets can be defined as variables to be determined when the linear equations are solved in step 190 so that a key objective is preferentially addressed, but a subordinate objective of the same type is also recognized.

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For example as indicated in step 178, an employer may view  $TARGET_T$  as a savings target that must be met, and equation (8) was so structured to reflect that objective with the variable  $MISS_T$  being introduced into the objective row (3) to reflect the amount of failure to meet that objective. If the employer further desired any additional savings that might be realized above  $TARGET_T$  up to  $TARGET_T'$  to be equally beneficial from its perspective as an added value of its plan to the employees, then a new equation similar to (8) may be constructed as follows:

20

$$SAVE_T - TARGET_T' + MISS_T' \geq 0 \quad (14)$$

25 Consider now the effect of inserting the independent variable  $MISS_T'$  into the objective row (3). Since the coefficient of the added value to the employee of the new flexible plan  $ADDEMP_T$  is set with the highest priority in the objective row (3), in order to have equal counter weighing, the coefficient of  $MISS_T'$  in the objective row would need to be -1. If, alternatively, the employer were to weigh the variable  $MISS_T'$  at half of the weight of the added value  $ADDEMP_T$  of the new benefit plan to the employees, then the coefficient of  $MISS_T'$  would be -0.5.

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Step 198 may in one illustrative embodiment of this invention be implemented by a matrix generator. The modification of the linear or mixed integer program may be accomplished manually, or, if produced by a matrix generator, then by alteration of that matrix generator. Generally, such a matrix generator permits an operator without significant technical training in computers or mathematics to compose and enter instructions in nontechnical language which direct the generator of step 198 to

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change its priorities by any of the above described procedures. A manual change is usually quite simple for the comparability small models of this invention: Typically, linear programming computer software program, such as that noted above, may have sections for: 1) defining the sequential ordering of the variables, 2) definition of the objective row, 3) statements of constraining equations, and 4) any bounds to independent variables. It is straight forward for one skilled in this technology to modify any of these directly to achieve a desired alternative result.

Step 190, as discussed above with respect to FIG. 4, described linear programming for solving the set of linear equations (2) - (11). In a further embodiment of this invention, that linear programming may include mixed integer programming, which processing is available in the commercially linear programming software noted above. The structuring of equations in mixed integer programming is done similarly as when none of the variables is required to be an integer. The only difference is that certain of the variables can be specified to assume solely integer values; as with linear programming, all other variables are allowed to assume any value consistent with the equation constraints.

Mixed integer programming permits the processing of both integer variables and variables that need not have integer values. An illustration of the use of such programming is set out as follows: Often, the time period of interest is a year. An employer wishes, for simplicity of its employees' calculations, that the employee contributions toward health cost is to be some multiple of \$10 on a monthly basis, which would thus be a multiple of  $12 \times \$10 = \$120$  on an annual basis. Instead of using equation (5) as structured above, one might define each variable  $EE'_{Ai}$  to be equal to  $EE_{Ai}/120$ , and restate equation (5) as:

$$EE'_{Ai} + ER_{Ai} / 120 - A_i / 120 = 0 \quad (15)$$

, where  $EE'_{Ai}$  must assume a non-negative integer value. Alternatively, if the particular mixed integer capability of the software permitted the integer values for a variable to be specified as multiples of some constant, here that constant would be 120 for  $EE_{Ai}$  and equations (5) would be left intact in the original form.

A particular form of the use of mixed integer feature in linear programming is the use of binomial variables, i.e., variables to be allowed to have a value of only 0 or 1. An example of the use of a binomial variable is as follows: An employer deems that once it has achieved its savings target  $TARGET_T$ , it would like to provide a new, mandated benefit of group long term disability for its entire employee population even before trying to level the disparity variable  $DISP_{MAX}$  between the most and least richly benefited employee classes. Then, for equation (6) for determining the total employer cost  $COST_T$  for the new plan of flexible benefits, instead of treating the cost of long term disability, say benefit J, as a constant  $J_c$ , one could create J as a binary variable which has a coefficient in the form of constant  $J_c$  in equation (6) that is the cost of that benefit. In the objective row (3), one would introduce



a penalty  $-M'$  that is an order of magnitude greater than  $-M_3$ , but also an order of magnitude smaller than  $-M_4$ . In this manner, the long term disability coverage will be introduced into the mixed integer programming as a priority below the targeted cost savings but above a reduction in disparity between the most and least richly benefited employee classes. Thus, when the set of linear equations, now including the equation (6) as modified to include the binary variable  $J$ , are solved, the solved value of this binary variable  $J_c$  may be either a "0" as would indicate that the long term disability insurance would not be included in the new plan of flexible benefits or a "1" as would indicate that the disability insurance was to be included within the plan. Thus, the use of such binary variables and the linear programming provides a mechanism for deciding whether or not a particular benefit is to be included within a proposed benefit plan in accordance with the prioritized sequence of employer goals.

This invention is not only applicable to optimization models for which constraints are defined as linear relationships, but also for which the objective row need not be solely the sum of first order (linear) variables but may include higher or lower order expressions and/or variables as well. When a substantial deviation from a target savings  $TARGET_T$  is considered by the employer to be a much greater concern than a small deviation, the priority or significance of any deviation from the target savings, i.e., the variable  $MISS_T$ , may be enhanced by squaring the variable  $MISS_T$  in the objective row. Thus when any deviation from the target savings occurs, the resultant penalty is squared, in contrast to the linear scaler penalty, which occurs when the coefficient is the variable  $MISS_T$  as would be the case with the linear programming described above. There are further commercially available programs, which can handle models with linear constraint rows but also with non-linear objective rows.

This invention also contemplates the use of the sensitivity analysis, which is included in selected of the above noted linear programming software programs. For example in linear programming, a shadow cost is the decrease in optimal value of the objective row resulting from a unit increase in a non-basis variable, assuming the final basis remains feasible. This can be a useful analysis tool in a number of respects. It can be used to identify the cost of certain limits that the employer has placed on its requirements. Since some of those requirements (such as for example a dollar savings  $SAVE_T$  to be realized) may not necessarily be intended as an exact amount, it may be helpful to convey the impact of a change in such requirements on the objective row in case the employer may wish to consider such a change.

Another sensitivity measure is a shadow price. This measure indicates the unit worth or adverse impact produced by a row that, respectively, specifies resources provided or constraints required.

Also potentially useful as a row related statistic is slack, if any, in that row in the optimum solution; slack indicates how much that resource may be reduced, or a constraint eased, without impacting the optimum solution.

Upper or lower activity levels often displayed with a shadow value indicate how far that variable or constraint may be changed, without changing other constraints and still have those same shadow costs or shadow pricing prevail. Activity levels may be useful, for example, in the hierarchical objective approach illustrated for this invention. An employer may consider the desirability of easing a particular constraint by the amount of that activity level in order for other considerations to apply in the subsequent analysis using the linear program approach.

For linear programming software, such as that described above, sensitivity capabilities are normally furnished. For non-linear programming, when not furnished, such sensitivities can be obtained by sequentially altering variable bounds or constraint limits and obtaining model results.

Referring now to FIGS. 1C, D and E, 5, 6, 7A, B and C, and 8A, B, C and D, there is shown respectively the network system 11, a set of functional flow diagrams 206 and 208 showing how a database/webserver 28 is initialized in preparation for processing data for each new group of employees for a new or the next employer, a flow diagram 210 showing how the database/webserver 28 is initialized originally, how the database/website server 28 operates to permit an employee to review and to select the individual products of his or her flexible benefit plans, and the webpages generated by the database/webserver 28 and displayed on the employee's client terminal 10' to facilitate the selection by the employee of the benefit products for the flexible benefit plan.

Referring now particularly to FIG. 1C, the network system 11' will now be described in greater detail. There is shown a plurality of the data processing systems or client terminals 10a', b', c' and n'. Each client terminal 10' permits the exchange of data to and from a website 26 over the internet 24. Each client terminal 10' may illustratively take the form of the data processing system as shown in FIG. 1A as modified by the inclusion of the communications interface 22' as described above. The Internet is also connected for the bidirectional flow of data with the website 26. The website 26 includes a database/website server 28, a data base 30 and a website user interface 32.

As will be explained in greater detail below, FIG. 1D illustrates how the database 30 is subdivided into first, second, third, fourth and fifth memory portions 30A, B, C, D and E. The first memory portion 30 A receives and stores data related to the processing of employee benefit plans. The second memory portion 30B receives and stores a set of employee tables, one for each employee of the group for whom the plan of benefits is being selected. Each employee table bears data reflecting a plurality of characteristics for its employee. The third memory portion 30C receives and stores data in the form of product tables, which will be described in greater detail below. The fourth memory portion 30D receives and stores data related to those product tables that correspond to the products that are a part of the present benefit plan. The fifth memory portion 30E receives and stores tables of pointers or rules that correlate a particular employee with a corresponding product.

Referring now to Figure 5, there is shown the flow diagram 206, which is executed every time that the database/website server 28 (FIG. 1C) is to be use for a new group of employees or employees of another employer. First in step 212, the website 26 is initialized by down loading data or information regarding the employees and information about the products that may make up the benefit plan. In particular, data in the form descriptions of the benefit products and the carriers that provide such products are stored in a memory subportion 30A1 as shown in FIG. 1D. Data related to product rates and prices are stored in a memory subportion 30A2, while data related to the employer's contributions and allocations to purchase certain products is stored in a memory subportion 30A3. Next in step 214, data related to employee census or demographic information, e.g., name, age, address, current benefit selections, etc., are downloaded to and stored in a memory subportion 30A4.

Next in step 216, the employee census or demographic data stored in the memory subportion 30A4 is accessed and is used to construct a table for each employee of a group or employer. Each such table is tagged with an ID of the employee and further lists that employee's characteristics. In turn, the constructed employee tables are restored in the second memory portion 30B (see FIG. 1D).

As will be described below with respect to FIG. 6, step 222 constructs a table for each product within that present library or universe of products available to be incorporated into the flexible benefit plans to devised in accordance with the teachings of this invention. Each product table not only includes a complete list of characteristics to describe its products, but also a set characteristic norms, which describe the norms of a set of similar benefit products. It is appreciated that different carriers provide similar funds that have similar but not identical characteristics. The similar characteristics are represented by norms, whereby as will be explained a single characteristic norm may be used to select products from different carriers, appreciating that the library of available products will not normally include all similar products from all carriers or even most carriers. As will be appreciated, a characteristic norm is used to pick all of the available products that match that norm, whereby one product from one carrier may replace a similar product from another carrier, as long as the replacement or alternative product is identifiable by the characteristic norm.

Returning now to FIG. 5, step 218 accesses from the library of available products those tables as stored in the third memory portion 30C that correspond to the products that have been selected to be included with the present flexible benefit plan; these selected tables are stored in the fourth memory portion 30D (FIG. 1D) to be used for processing by the flow diagram 210 as will be described with respect to FIGS. 7A, B and C.

Referring now to FIG. 6, step 220 constructs for each normalized product a table of rules or pointers that correlate a particular employee to a corresponding normalized product. As explained above, an employee's characteristics may include among others age, income, gender, marital status, address, etc. A rule or pointer may take the form of any number of embodiments as would be obvious

to one skilled in the art. In an illustrative example, a rule or pointer could take the form of a matrix graph 36 as shown in Figure 1E. In particular, this rule 36 generally correlates or relates certain employee characteristics, i.e., age and income, to a recommendation to that employee in the form of a "yes" to accept that particular product or a "no" to reject that particular product. In this particular example, the positive recommendation is proportional to both age and income, i.e., a recommendation to accept this product is given only to those employees of greater age and income. In this example, the product could have illustratively been a Preferred Provider Organization (PPO) or a more robust retirement plan. If on the other hand the product was a Health Maintenance Organization (HMO), the recommendations of the matrix rule 36 shown in FIG. 1E would be reversed. At least in general, the rule for an HMO would be a "yes" to younger employees having relatively smaller incomes. Illustratively, the product rule tables are constructed empirically base on experience with benefit products and plans. In other embodiments, a rule would process an employee characteristic indicating that the employee has children, to suggest for that employee life insurance. A further rule would process employee characteristic indicating that the employee has modest liquid financial reserves, to suggest a short term disability product for that employee. From an overall perspective, the rules are designed to act together to suggest benefits that will protect the employee in the event of sickness, disability, death and retirement on a tax effective basis. After the product rule tables have been constructed, they are stored in the third memory portion 30C of the database 30 as illustrated in FIGS. 1C and D.

Next as described above in detail with respect to FIG. 5, step 222 constructs a set of normalized product tables, one such table for each normalized product that is available. The normalized product tables are stored in the fourth memory portion 30D of the database 30. At this point, the database 30 has been at least initially prepared to permit each employee of the identified group to access this data and to use the network system 11 as shown in FIG. 1C to select a group or plan of benefit products for that employee, as will now be described with respect to FIGS. 7A, B and C.

In particular, each employee can log onto the website 26 from a remote client terminal 10'. As shown in FIG. 1C, the Internet 24 interconnects each of the client terminals 10a' to 10n' to the website 26. This system 11 permits the employees to use this invention from the convenience of their office or home. Each employee is given a password or other appropriate key to permit access to the remote website 26 in that the employee and product information retained at the website 26 is sensitive and confidential. In at least one embodiment of this invention, the website 26 is constructed and maintained by a third party service provider to the employer; in that situation, the website 26 would be disposed typically at the premises of the service provider as opposed to the employer.

Referring now to FIG. 7A, the employee initially inserts his or her password to gain access to the website 26 and, thereafter in step 230, to supply a missing employee characteristics which might not be included in the census and demographic data that was previously inputted in step 214 of the

initialization process into the memory subportion 30A4 of the database 30. First, step 230 compares the present data content of subportion 30A4 with a list of the required census characteristics to identify those missing characteristics. If missing characteristics are identified in step 230, step 232 then prompts the employee to supply these missing characteristics. In particular, the programmed database server 28 generates and transmits a webpage 300a via the Internet 24 to that remote client terminal 10' from which the employee accessed the website 26. That client terminal 10' displays the webpage 300a on its CRT 14 (FIG. 1A).

As shown in FIG. 8A, the webpage 300a includes in its upper portion a set of blocks for each of the required census characteristics, i.e., "marital status" 302, "age bracket" 304, "family income" 306, "spouse employed" 308, "dependents" 310 and "special circumstances" 312. It is appreciated the required census characteristics may include further items as would be recognized by one skilled in this art. In turn, each required characteristic includes a number of related boxes that the employee may click on to enter that related characteristic. For example, blocks 302a and b are associated with "marital status" 302. The employee will click on block 302a if he or she is "single" or block 302b if "married". If the characteristic for "marital status" 302 has been previously entered, a check mark will appear in the correct block 302a or b. However if this required characteristic has not been input by the employee, the blocks 302a and b will remain blank, thus prompting the employee to enter this characteristic by clicking on those boxes which have been left blank. In this fashion, the employee is prompted and guided into entering the missing required characteristics.

The bottom portion of the webpage 300a provides a graphical display of the products 318 of the employee's current flexible plan organized by product category. For example, the employee's current plan includes a PPO identified by an icon 318c, a dental plan indicated by the icon 318d and a group term life policy (GTL) indicated by the icon 318g. The available product categories are identified by a plurality of platforms 316, which illustratively include a flex platform 316a, a vision platform 316b, a medical platform 316c, a dental platform 316d, a disability platform 316e, a retirement platform 316f and a life insurance platform 316g. If an icon 318 is placed on a particular platform 316, the webpage 300a indicated that the present benefit plan includes a product of the related product platform 316. On the other hand if a category platform 316 lacks an icon 318, the webpage 300a indicates that the employee's present benefit plan lacks such a product. The webpage pages 300 "point" to products customarily needed or selected by employees with a similar set of characteristics, personal goals and similar risk tolerances.

Next, step 234 displays one or more new webpages 300 (not shown) which prompts the employee to input further information as to her or his risk tolerance, preferences etc. Illustratively, the webpages would display a series of questions designed to elicit information about the employee's preferences, acceptance of risk, that target contribution that he or she is able or willing to pay for their benefits, and various aspects of the employee's financial condition. The employee's financial condition

of interest would include among other characteristics the amount of liquid reserves, the amount of life, short term and long term disability and the total of liquid and invested resources. For example, a question may ask whether the employee could support his or herself if disabled for 6 months. Another question would ask whether the employee's spouse could support her or his self if the spouse died.

5 These and other questions as would be apparent to one skilled in this art are within the scope of this invention. The information input in steps 232 and 234 are in turn incorporated in the characteristic table of the corresponding employee. In one illustrative embodiment of this invention, the webpage would present boxes with various answers to these questions. Depending on which boxes are clicked on or numerical amounts entered by the employee, a particular product recommendation would be  
10 suggested to the employee. Then, step 236 accesses from the fourth memory portion 30D those product tables that correspond to those products that are included or offered with the current benefit plan of the employee.

The employee now clicks on an "analysis" button 314 as shown in FIG. 8A, which initiates step 240 as shown in FIG. 7B. Step 240 now accesses each of the employee characteristic tables retained in  
15 the second memory portion 30B of the database 30 and each of the normalized product tables stored in the third memory portion 30C. Step 240 then compares and weighs each employee characteristic table against each normalized product table to develop a list of the suggested products. In other words, step 240 looks at each needed product category 316 and the available products in the current plan design and identifies those products to which the rules point. The rules point to those products which by custom  
20 or experience are known to be appropriate for a particular employee with a given set of characteristics.

Next, step 242 accesses from the third memory portion 30C those available product tables of the suggested products, which in turn are stored in the fourth memory section for later use by the flow diagram 210. Then, step 244 constructs and transmits a webpage 300b to the requesting client server  
10' (FIG. 1C) whereby the webpage 300b is displayed on the CRT 14 (FIG. 1A) as shown in FIG. 8B.  
25 In particular, the webpage 300b displays the suggested products developed by flow diagram 210 in the form of icons 320. In the illustrative embodiment of FIG. 8B, the suggested products developed by this invention would include the Section 125 plans 320a (such as cafeteria plans, dependent care accounts, medical reimbursement accounts, or the payment of pretaxed premiums, the medical product 320b, the disability plans 320e-1 and 320e-2, the retirement program 320f and the life insurance 320g. Further,  
30 numbers are superimposed on each of the icons 320 by the program 210 to indicate the priority of each suggested product based on some financial value and risk potential. Illustratively, the priority is associated with the allocations of the employer's and employee's funds to particular benefit products, it being appreciated that the higher the priority assigned to a product, funds will be allocated to those product(s) to achieve the higher priority.

35 The webpage 200b includes a display bar 322 and a "details" button 324, which permits the employee to review further details of a particular product. First, the employee clicks on the "details"

button 324, whereby step 248 brings up on the webpage 300b the display bar 327, which includes for the various products the following buttons: a "flex" button 326a, a "medical" button 326b, a "dental" button 326c, a "vision" button 326d, a "disability" button 326e, a "life insurance" button 326h and a "retirement" button 326g. When the employee clicks on one of the buttons 326, further more detailed information about the corresponding suggested product is displayed on the next webpage 300c on the employee's CRT 14. As seen in FIG. 8C, the webpage 300c includes a window 332 where more detailed information about the selected product and the rationale for selection is displayed.

The webpage 300c also permits the employee to change the priorities assigned to the different categories of products and includes a button 330 for each product category; for example, the employee clicks on button 330a to select pre-tax eligible products for reprioritizing. Further, each select button 330 has an up button 328a which may be actuated to raise the priority given to its product category, and a down button 328b which may be actuated to lower its priority.

Referring now to Figure 7C, the employee now actuates the advance button 322b of the webpage 330c, whereby the flow diagram 210 moves to step 250, which calculates and allocates the cost of the products included within the suggested flexible benefit plan, to the employer and the employee. In particular, the employee clicks on a salary illustration button 334, whereby a window 336 is generated and displayed on the webpage 300d. The window 336 displays both of the employer's and employee's contributions for the suggested benefit products, e.g., medical, dental, LTD, GTL, universal life and retirement (401(k)). In addition, it is contemplated that the total employee contributions, as well as the employee's take home pay will be displayed. Illustratively, the employee could click on a salary illustration button 334, whereby a "pay stub" window (not shown) would be displayed on the webpage 300d. In particular, this window would illustratively show the salary, the state and federal taxes, the employee's contribution for the various benefits and the remainder as the take home pay. Thus, the employee can make a decision as whether he or she can afford the indicated benefit in view of their cost and his or her remaining take home pay.

Referring now to FIGS. 8E and F, there are shown further embodiments of the webpages. Webpage 300e includes a further "show all products" button 339, which the employee may click on to show the other products offered within the flexible benefit plans. In particular, successive actuation's of the button 339, brings up the next earlier plan. In FIG. 8F, webpage 300f is shown that offers a plurality of select plan buttons 840a to f, whereby the employee may select the desired plan to be shown, before clicking on the "show plan" button 348 to have the employee and employer contribution (and other information) of that selected plan to be displayed. The employee can toggle back and forth between the display of suggested products and all products of the employer's plan by clicking successively on these product buttons 340. Further, the "select" button 346 can be actuated to select a product for further analysis, before clicking on the "details" button 344 to display the selected product in a window 342.

Next step 252 generates and displays to the employee a further webpage (not shown) that asks the employee whether the employee will accept the displayed products for his or her flexible benefit plan. The selection webpage provides a yes button (not shown) to accept the displayed products and a no button (not shown) to reject these particular products. The employee indicates her or his decision by clicking on one of the buttons. If the proposed products are rejected, the flow diagram returns to step 246', as shown in FIG. 7C. Step 246' displays the webpage 300c to give the employee the opportunity to reprioritize his products by appropriately clicking on the raise or lower buttons 328a and b, as explained above. If the priorities have been changed, the flow diagram 210 now moves to a step 234'. Step 234' performs the same functions as the step 234 shown in FIG. 7A and acts to modify the characteristic table of this employee to reflect the altered employee priorities. In particular, step 234' gives the employee at least a second chance to enter a new target amount that he or she wishes to pay for his or her benefit plan. The changed priorities and benefit contribution target are reflected in the employee's characteristics as indicated above. Then, step 240'(which is similar to step 240) compares the reconstructed characteristic table for this employee against each normalized product table to develop a revised list of suggested normalized products.

Next, step 248 permits the employee to again call for a further disclosure of the details of any of the revised list of suggested products by clicking on the buttons 324 and 325. Then as shown in FIG. 7C, step 250 again calculates and allocates the cost of the revised products to the employer and employee, as well as the total cost to the employee and her or his take home pay to the employee as displayed on the webpage 300d. Again in step 252, the employee is given a chance to accept or reject the revised suggested products. It is appreciated that the employee may repeatedly reject and revise the suggested products any number of times until he or she finds that a mix of products that he or she is satisfied with and can afford.

After the set of benefit products have been approved and finally accepted, the flow diagram 210 moves to step 254, which collects the data defining these selected products for further use. Finally, step 256 generates and displays to the employee a further webpage (not shown) that includes the selected benefit products, and the corresponding employer and employee contributions for these products.



## WHAT IS CLAIMED IS:

1. A method of facilitating the selection by at least one member of a given group of members of a set of available benefit products that comprise the one member's flexible benefit plan, said method comprising the steps of:

5 (a) inputting data reflecting the characteristics of the one member of the given group;

(b) constructing from the inputted data for the one member of the given group a member characteristic table including the characteristics of the one member;

10 (c) constructing for at least one of the available benefit products a corresponding rule table of rules, each rule of the rule table pointing the at least one member of the given group having a particular mix of characteristics to the one benefit product; and

(d) comparing at least one member characteristic table of the members of the given group with at least one rule table to develop for the one member a corresponding list of the benefit products for the one member's flexible benefit plan.

15 2. The method of facilitating as claimed in claim 1, wherein there is an universe of benefit products, and there is further included a step of constructing for each one product of the universe a table of characteristics of the one product.

20 3. The method of facilitating as claimed in claim 2, wherein there is included the step of extracting from the product characteristic tables of the universe of benefit products those characteristic tables that are available for the given group of members.

4. The method of facilitating as claimed in claim 3, wherein each product characteristic table includes at least one normalized characteristic to point to a normalized product.

25 5. The method of facilitating as claimed in claim 4, wherein step d) compares a member characteristic table to each of the available benefit product tables to identify one or more benefit products that correlate with at least one normalized characteristic.

6. The method of facilitating as claimed in claim 1, wherein there is included the step of inputting member census data from which step d) constructs each of the member characteristic tables.

30 7. The method of facilitating as claimed in claim 1, wherein there is included the step of inputting data indicative of the benefit products from which step c) constructs the benefit product tables.

8. The method of facilitating as claimed in claim 7, wherein the data inputting step a) further inputs data indicative of the carriers providing each of the benefit products.

9. The method of facilitating as claimed in claim 7, wherein the inputting step a) further inputs the pricing and rates of the benefit products.

5 10. The method of facilitating as claimed in claim 7, wherein the given group of members are employees of an employer and the data inputting step a) inputs the contributions of the employer to the cost of the benefit products.

10 11. A method of constructing a database for facilitating at least one member of one of a plurality of groups to select from a universe of benefit products a set of the benefit products to provide a flexible benefit plan for the one member, said method comprising:

(a) an act of constructing for at least one benefit product a table of rules, each rule pointing a member having a particular mix of characteristics to the one benefit product; and

(b) an act of constructing for at least one of the benefit products of the universe a table of the characteristics of the one benefit product.

15 12. The method of constructing a database as claimed in claim 11, wherein there is further included an act of defining each benefit product of the universe according to its category.

13. The method of constructing a database as claimed in claim 12, wherein there is included an act of assigning to each benefit product of the universe at least one normal characteristic that defines the characteristic of that category.

20 14. The method of constructing a database as claimed in claim 13, wherein the act b) constructs the one rule of the rule table to point the member having at least the one normal characteristic to at least one benefit product assigned to that category.

25 15. A method of constructing a database for facilitating the selection from a universe of benefit products by at least one member of a given group the benefit products to provide a flexible benefit plan for the one member, a first set of product characteristic tables having been constructed for each benefit product of the universe, each of the product characteristic tables comprising a plurality of characteristics indicative of the one product, said method comprising:

(a) an act of selecting from the universe of benefit products a set of benefit products for the given group;

(b) an act of extracting from the first set of benefit product tables a second set of product tables that correspond to the set of benefit products for the given group as selected in step a); and

5 (c) an act of constructing for at least one member of the given group a table of the characteristics of the one member.

16. The method of constructing a database as claimed in claim 15, wherein the given group is an employer and the members of the given group are employees of the employer.

10 17. The method of constructing a database as claimed in claim 15, wherein there is included an act of inputting member census data from which act c) constructs each of the member characteristic tables.

18. The method of constructing a database as claimed in claim 17, wherein the inputting act further inputs data indicative of the carriers providing each of the benefit products.

19. The method of constructing a database as claimed in claim 18, wherein the inputting act further inputs the pricing and rates of the benefit products.

15 20. A method of facilitating the selection from a universe of benefit products by at least one member of a given group of members, of a set of benefit products that comprise the one member's flexible benefit plan, said method comprising:

(a) an act of defining each benefit product of the universe according to its category;

20 (b) an act of assigning to each benefit product of the universe at least one normal characteristic that defines the characteristics of that category; and

25 (c) an act of constructing for at least one of the available benefit products a corresponding table of rules, at least one rule of the rule table pointing the one member of the given group having at least the one normal characteristic to at least one benefit product assigned to that category.

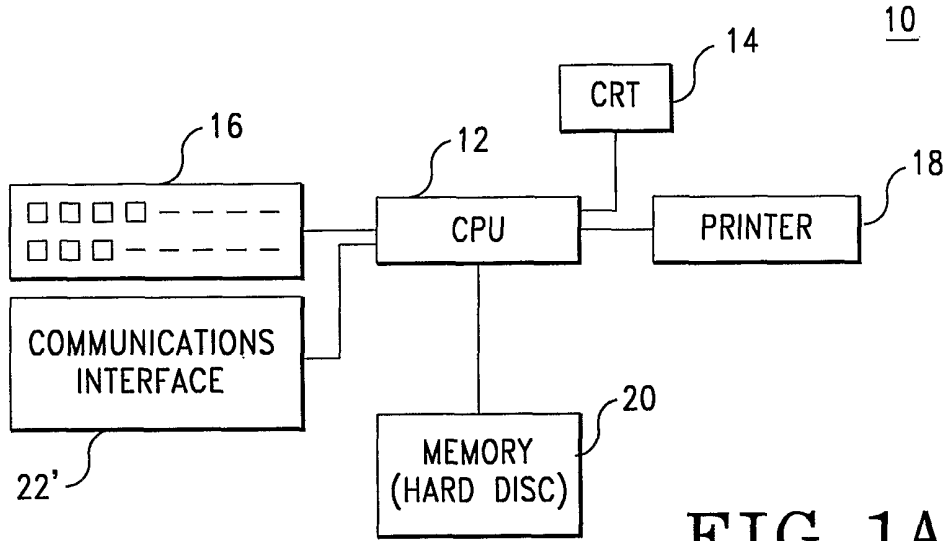
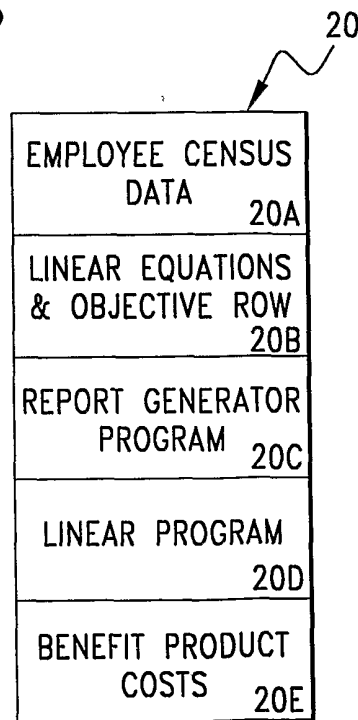


FIG. 1A

FIG. 1B



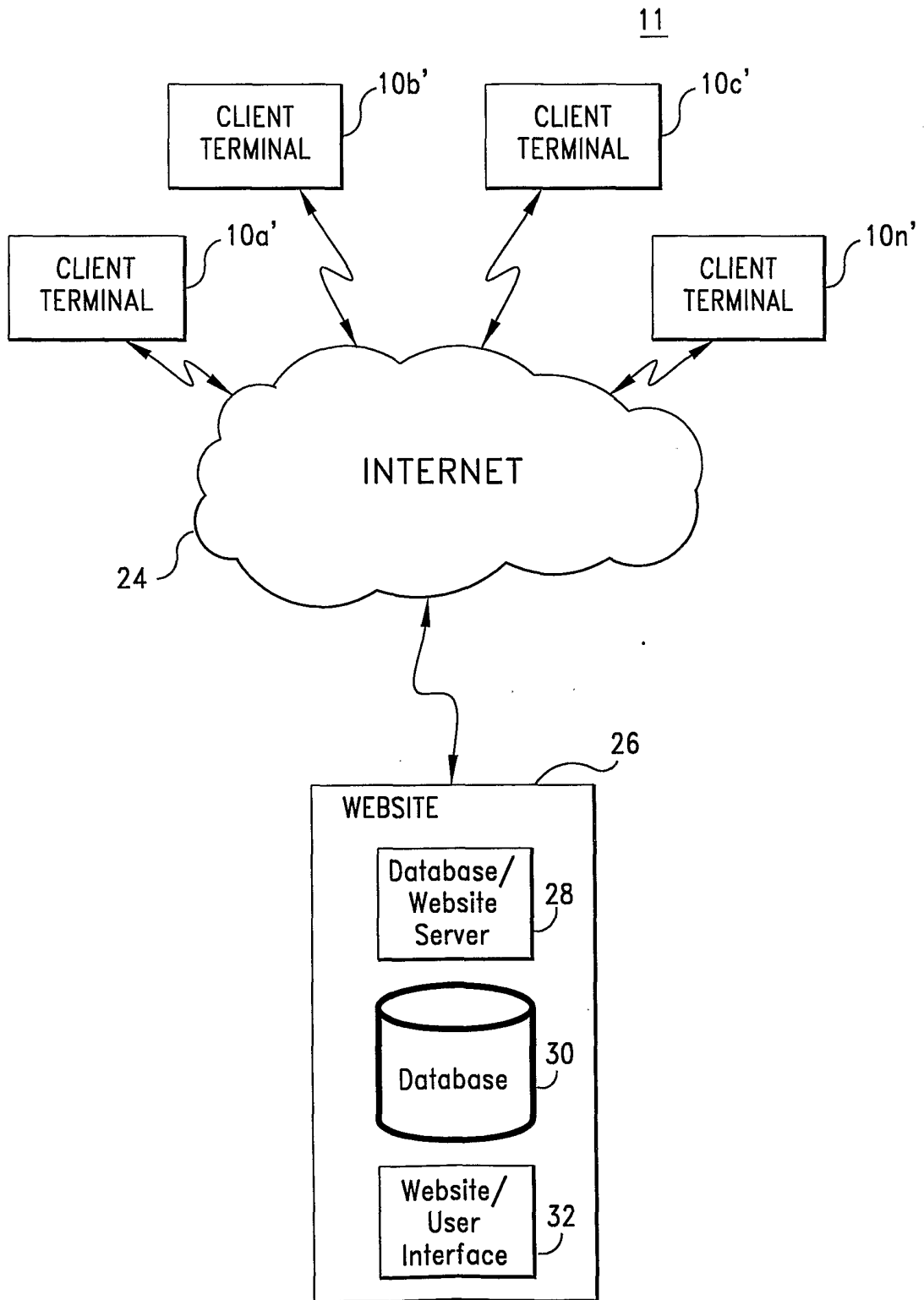
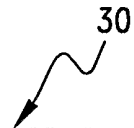


FIG. 1C

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FIG. 1D



|   |  |  |  |       |
|---|--|--|--|-------|
| Employee Plan Design                              |  |  |  | 30A   |
| Products/<br>Carrier<br>Descriptions<br><br>30A1' | Product<br>Rates/<br>Prices<br><br>30B2' | Employer<br>Allocations<br>Subsidies &<br>Contributions<br>30C3' | Employee<br>Census<br>Information<br><br>30D4' |       |
| Employee Characteristics Tables                   |  |  |  | 30B   |
| Normalized Product Rule Tables                    |  |  |  | 30C   |
| Product Tables of Present Plan                    |  |  |  | 30D   |
| Tables of Product Pointers                        |  |  |  | 30E   |
| Health:<br>30E1                                   | Disability:<br>30E2                      | Retirement:<br>30E3  | Life:<br>30E4                                  |       |
| HMO<br>30E1a                                      | LTD(group)<br>30E2a                      | 401K   | GTL 3  |       |
| PPO<br>30E1b                                      | STD<br>30E2b                             | 30E3a'   |  |       |
| POS<br>INDEM<br>30E1c                             | LTD(indiv.)<br>30E2c<br><br>STD<br>30E2d | 403B<br><br>30E3b'   |  |       |
|   |  |  |  | 30E4a |

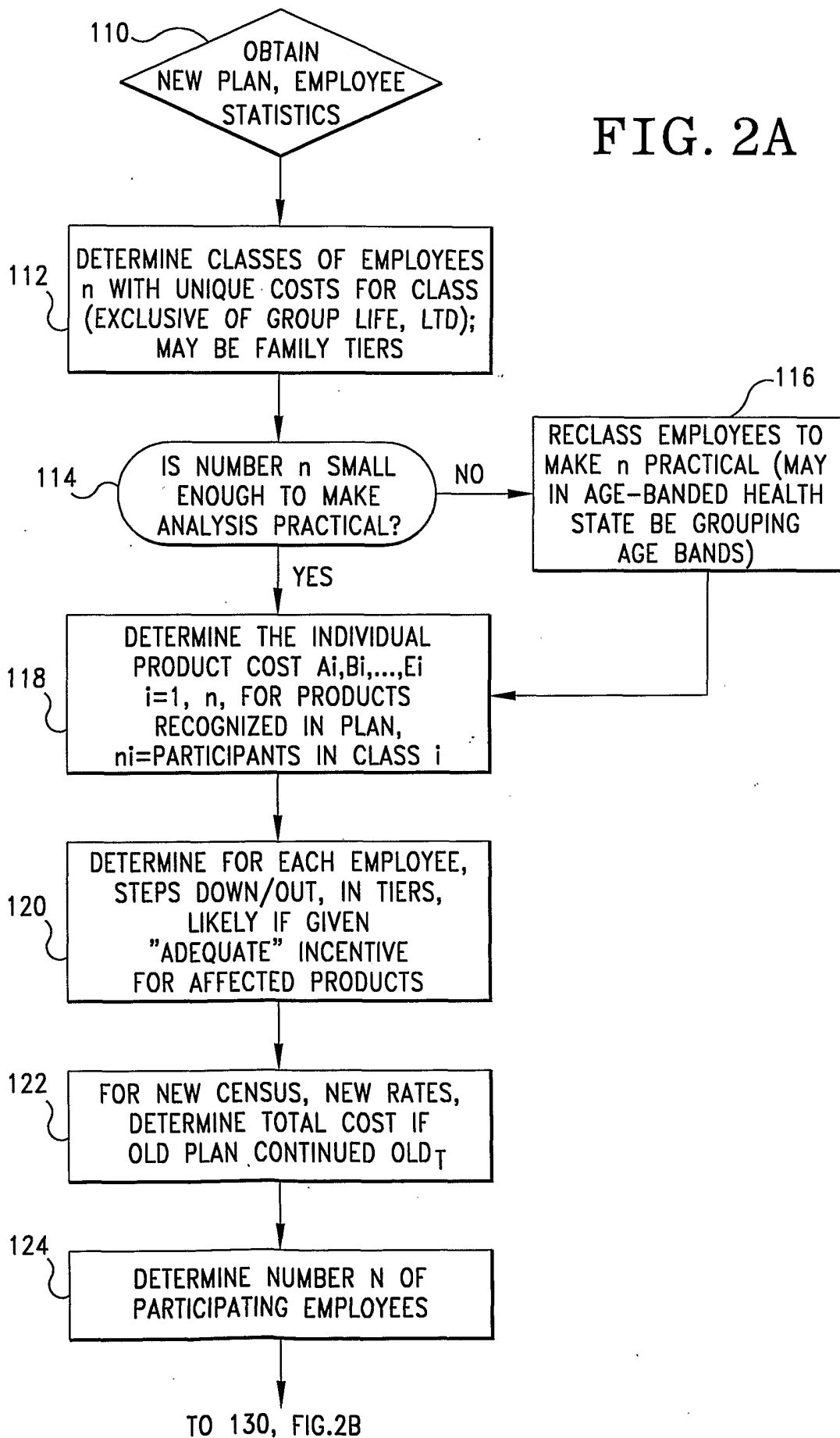
FIG. 1E

36

| Product A | INCOME |       | Age |     |
|-----------|--------|-------|-----|-----|
|           | \$60K  | \$30K | 25  | 45  |
|           | YES    | YES   | YES | YES |
|           | NO     | YES   | YES | YES |
|           | NO     | NO    | NO  | YES |

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FIG. 2A





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FIG. 2B

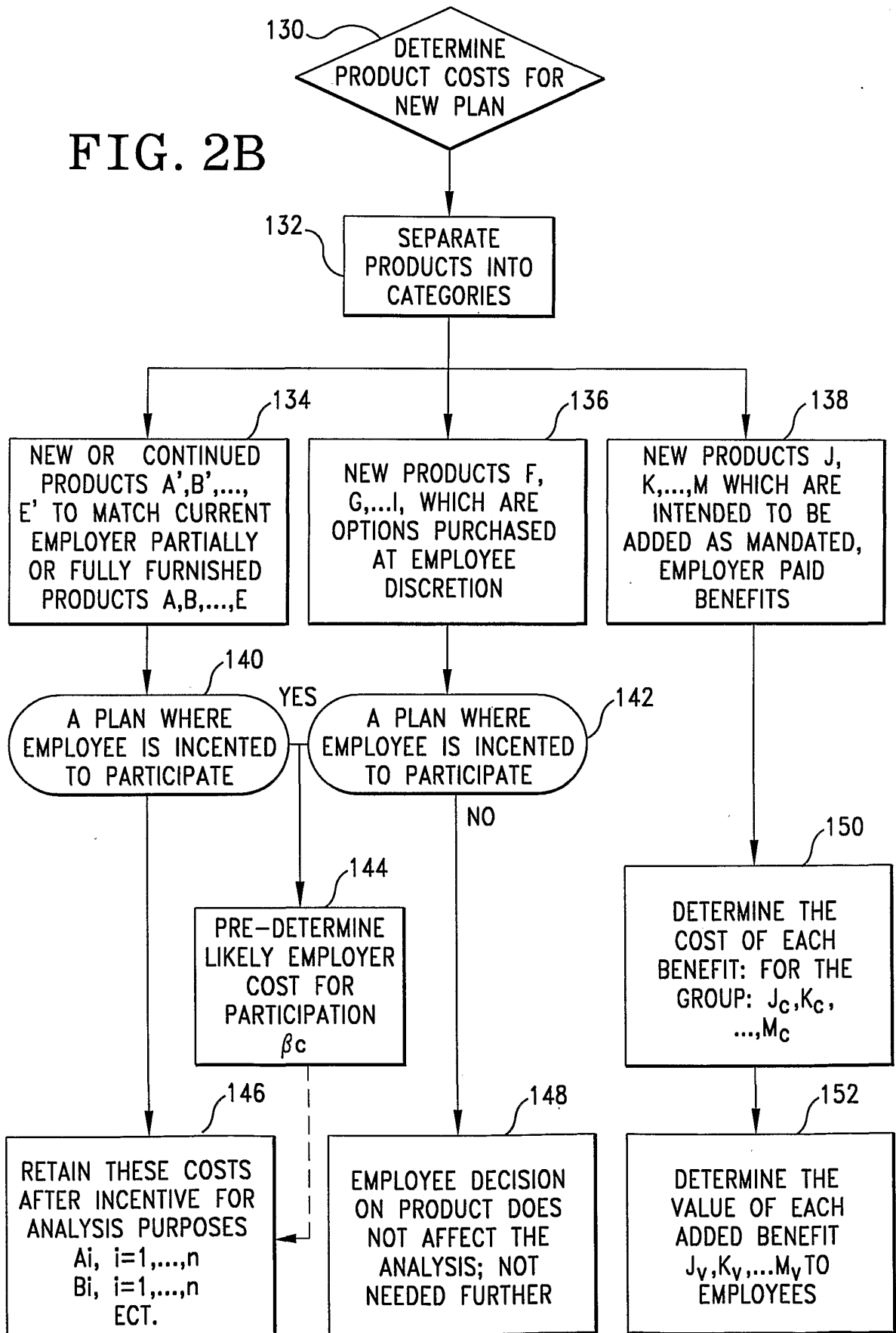
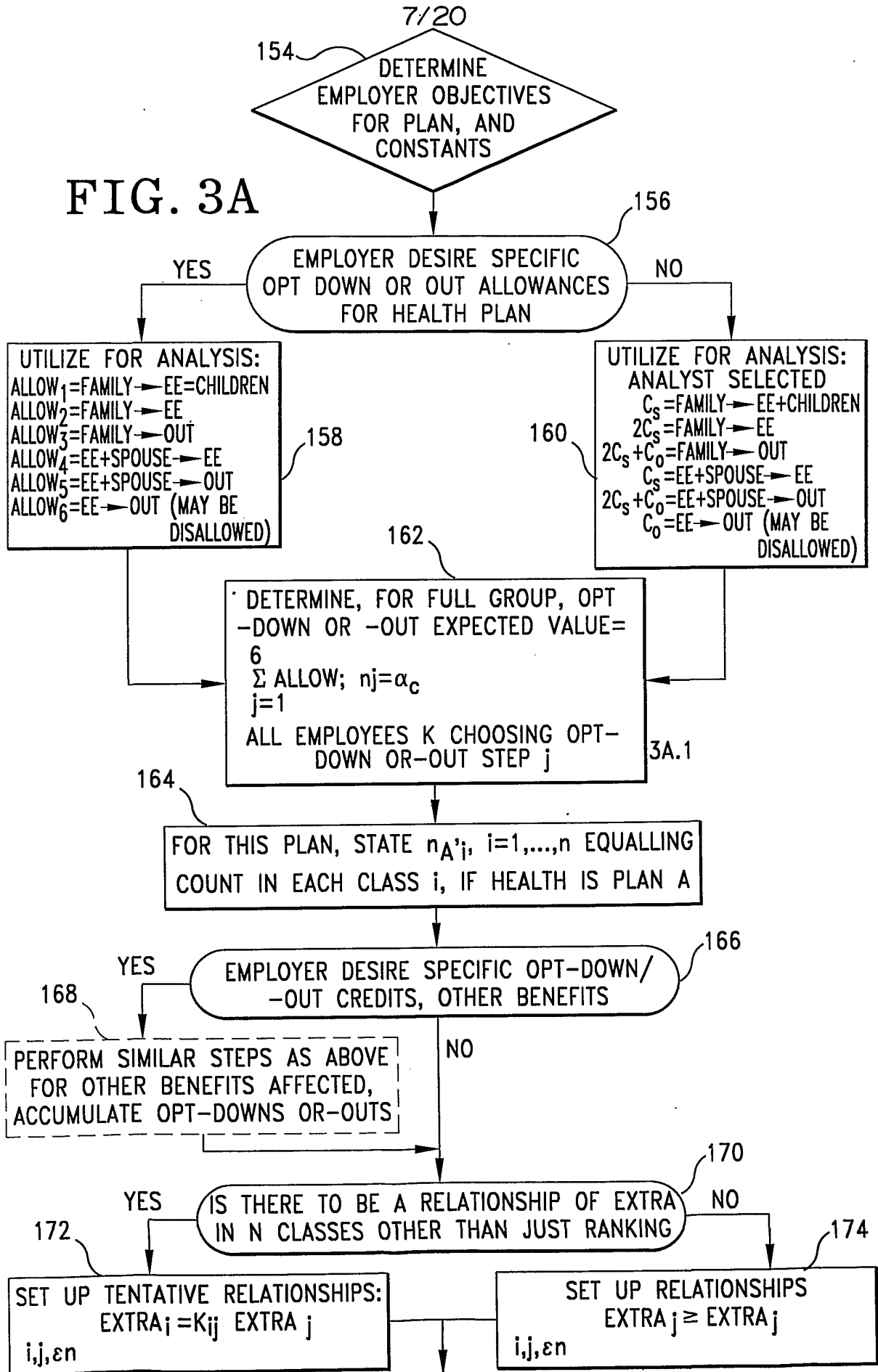


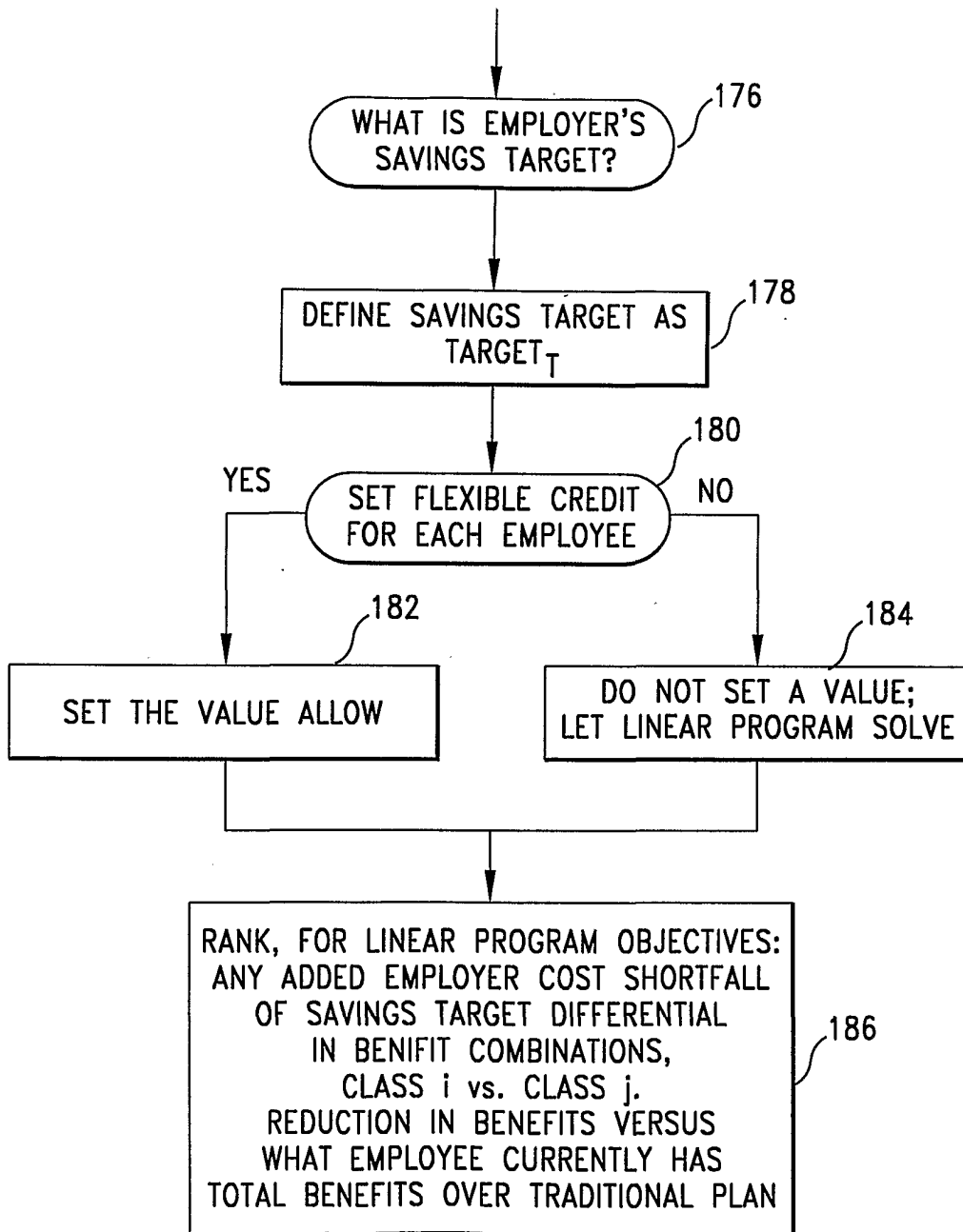
FIG. 3A



176, FIG.3B

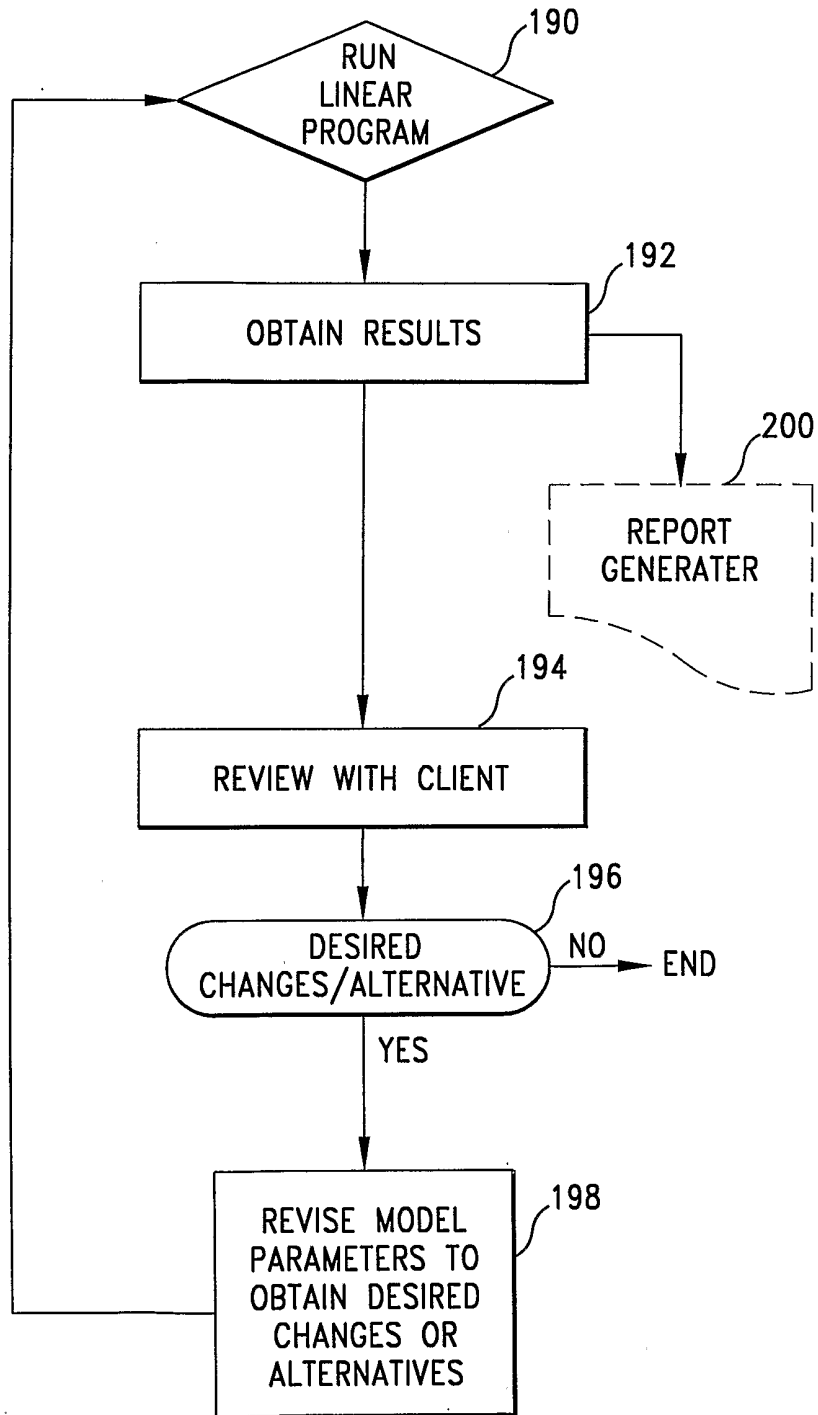
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FIG. 3B



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FIG. 4



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# FIG. 5

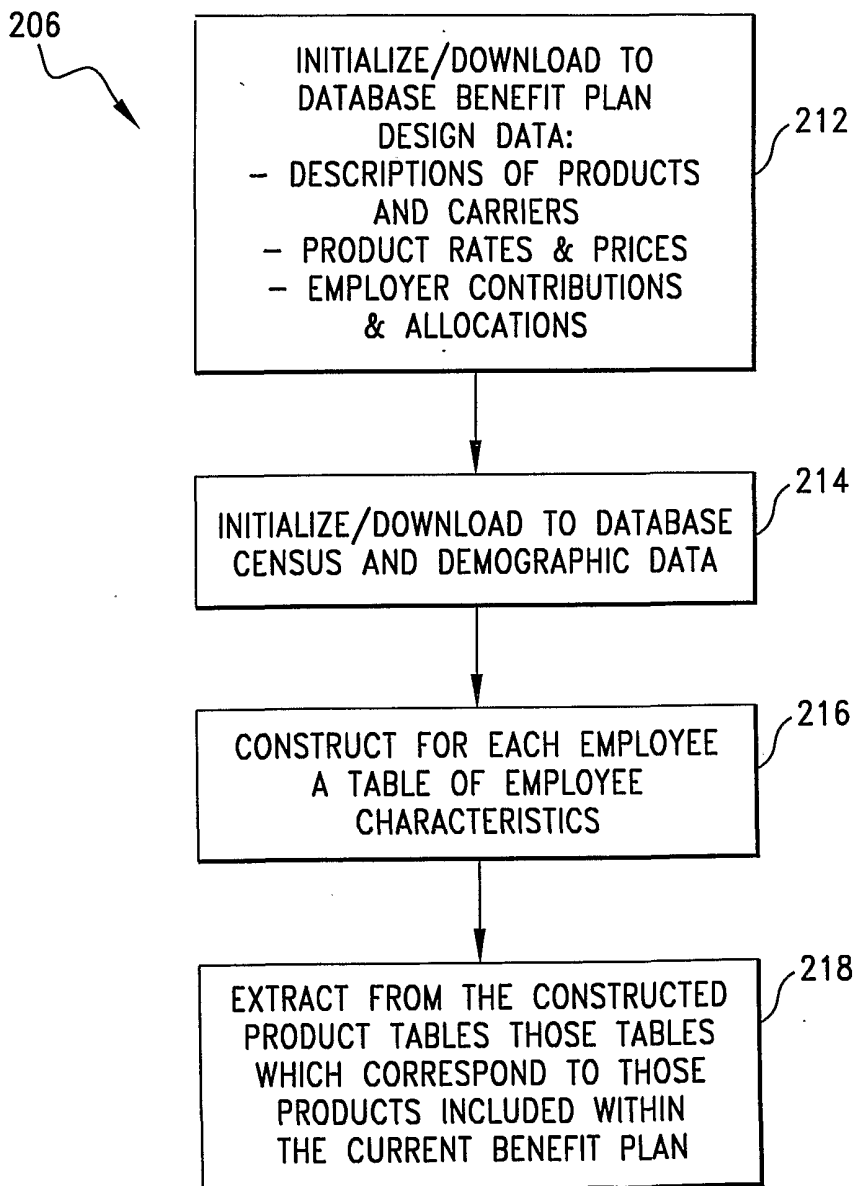
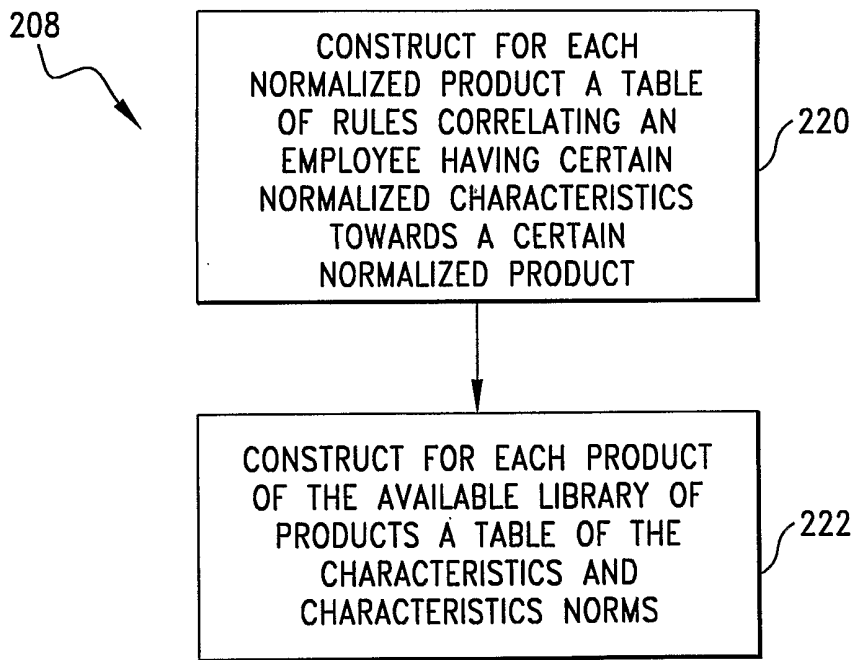
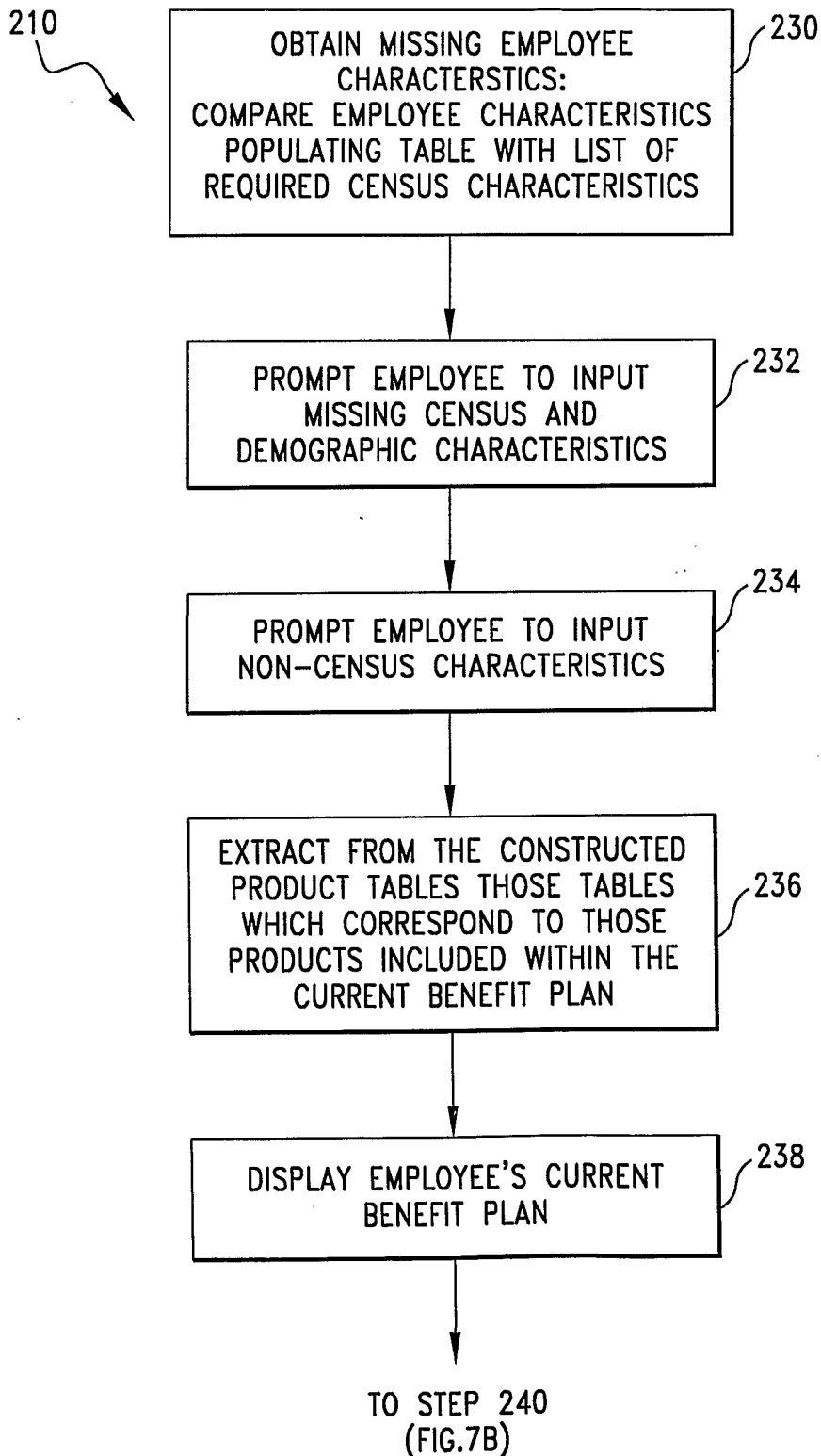


FIG. 6



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# FIG. 7A



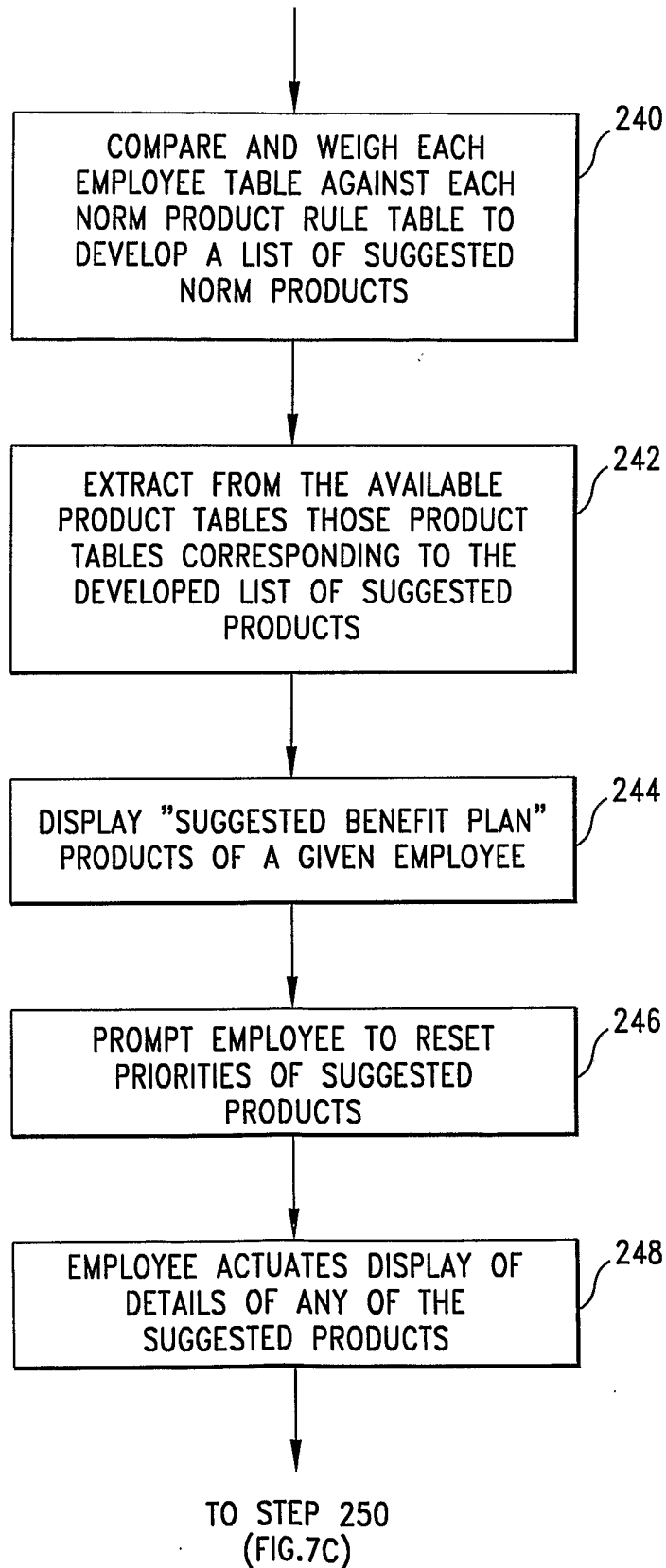
13/20  
**FIG. 7B**FROM STEP 238  
(FIG.7A)



FIG. 7C

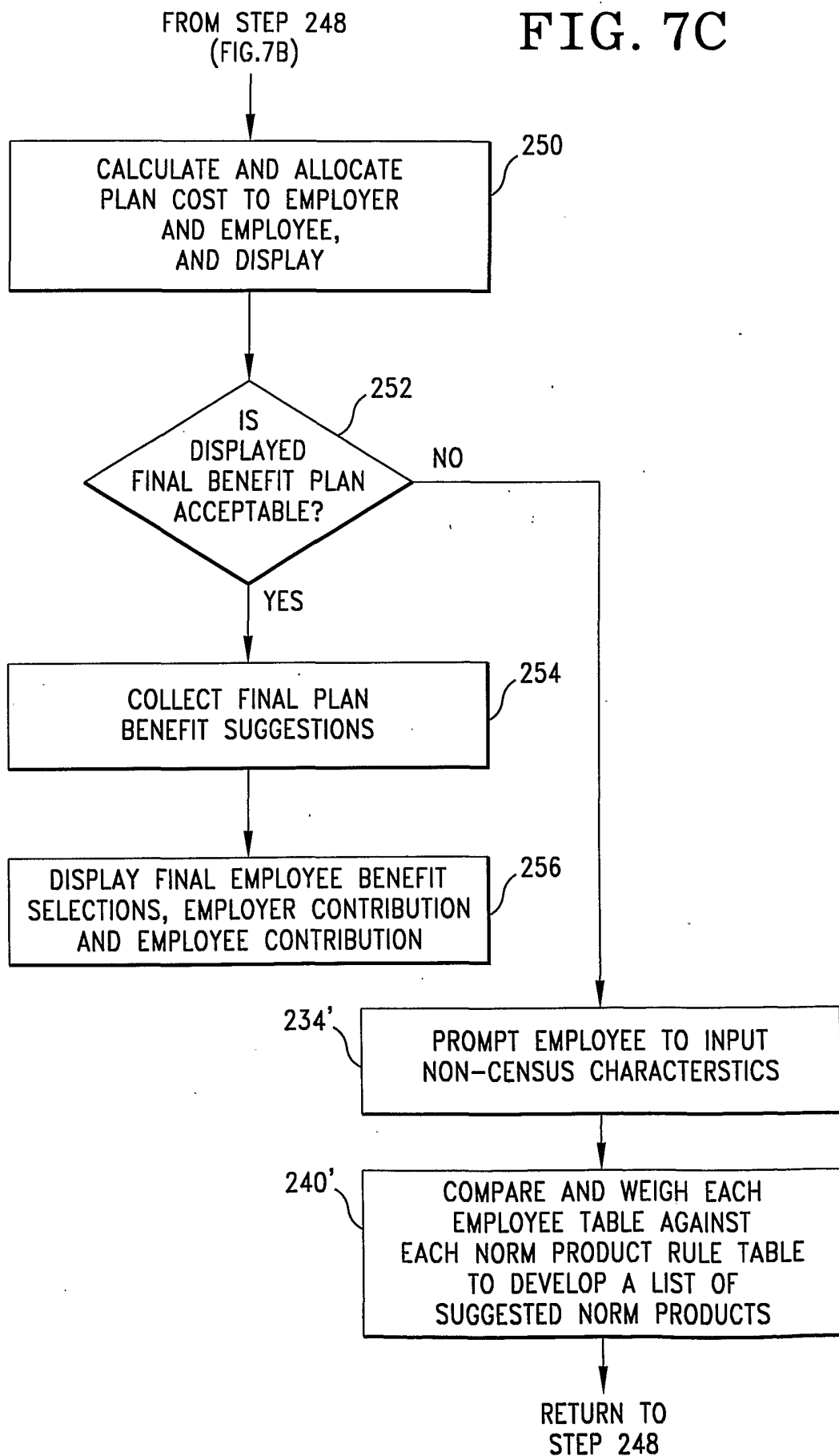


FIG. 8A

300a

Spouse Employed ~ 308  
 308a ~  Yes  No ~ 308b  
Dependents ~ 310  
 310a ~  Yes  No ~ 310b  
Special Circumstances ~ 312  
 312a ~  Medical  Dependent Care  
 312b ~  Elder Care  Other ~ 312d

Marital Status ~ 302  
 302a ~  Single  Married ~ 302b  
Age Bracket ~ 304  
 304a ~  18-25  26-35  36-45  46-62  62+ ~ 304e  
Family Income ~ 306  
 306a ~  <25k  25k-50k  50k-75k  >75k ~ 306d

Analysis ~ 314

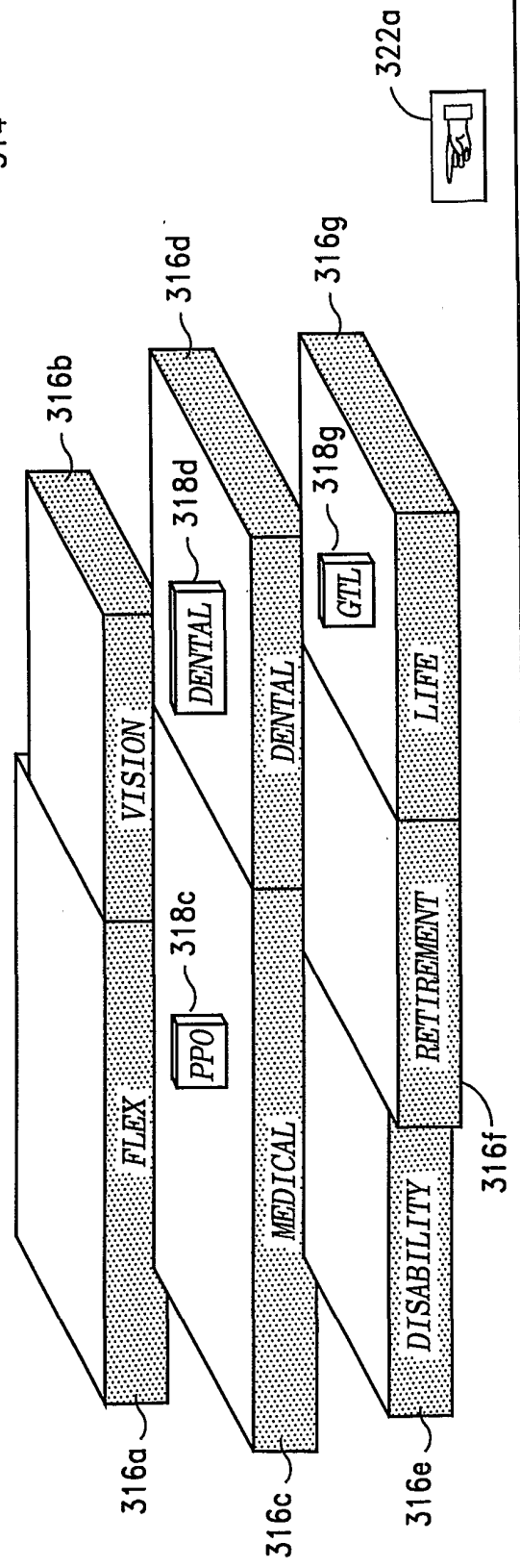


FIG. 8B

300b

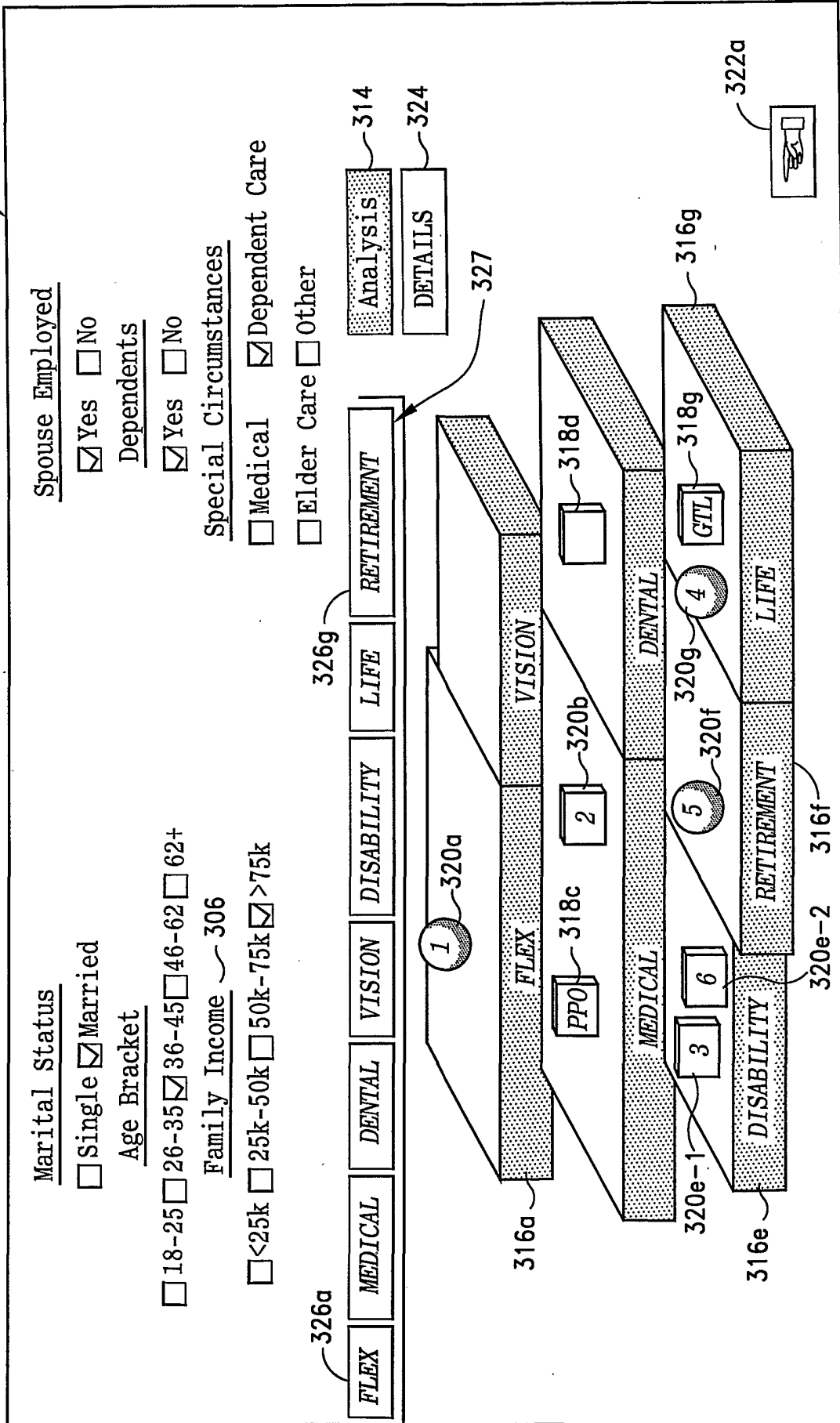


FIG. 8C

300c

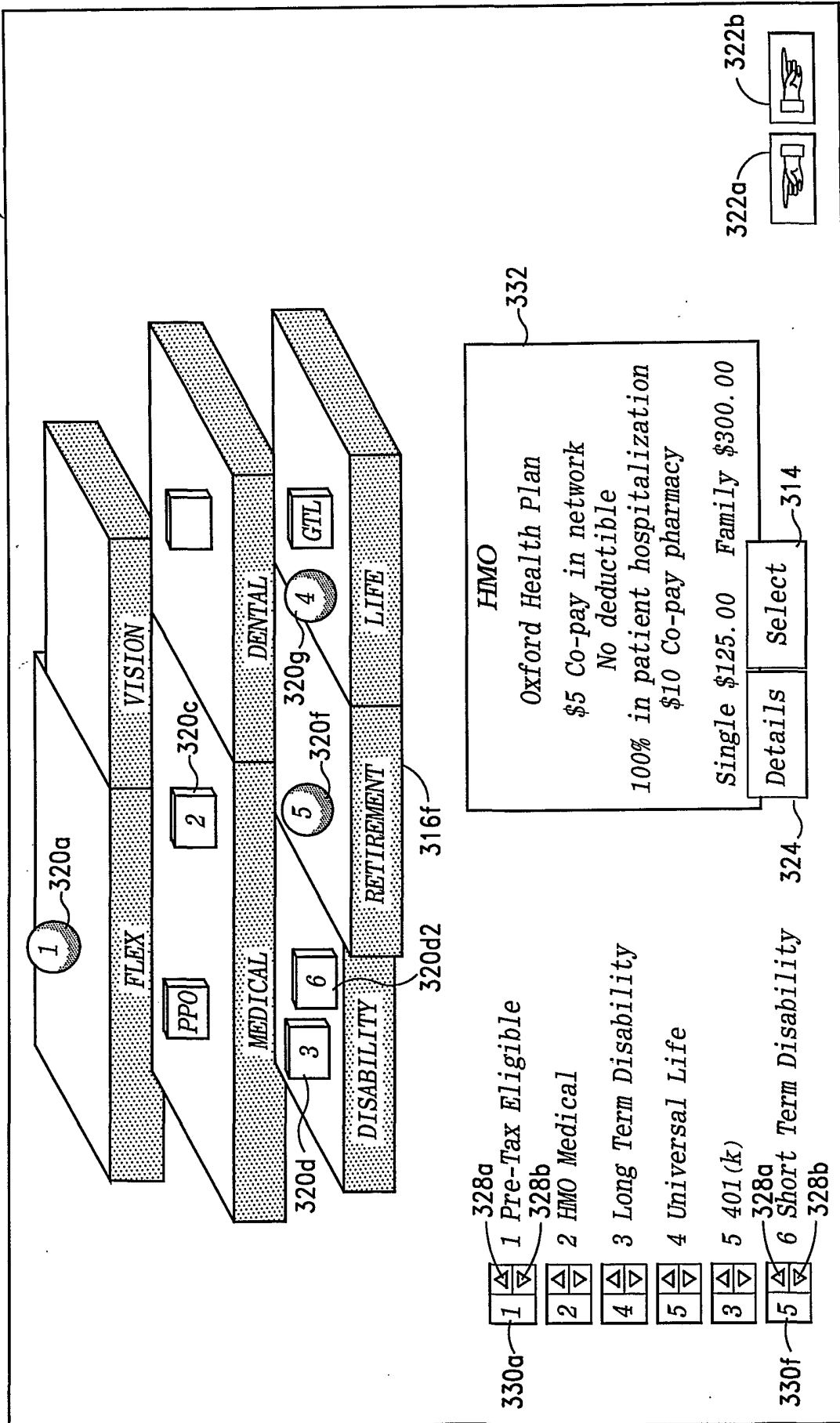
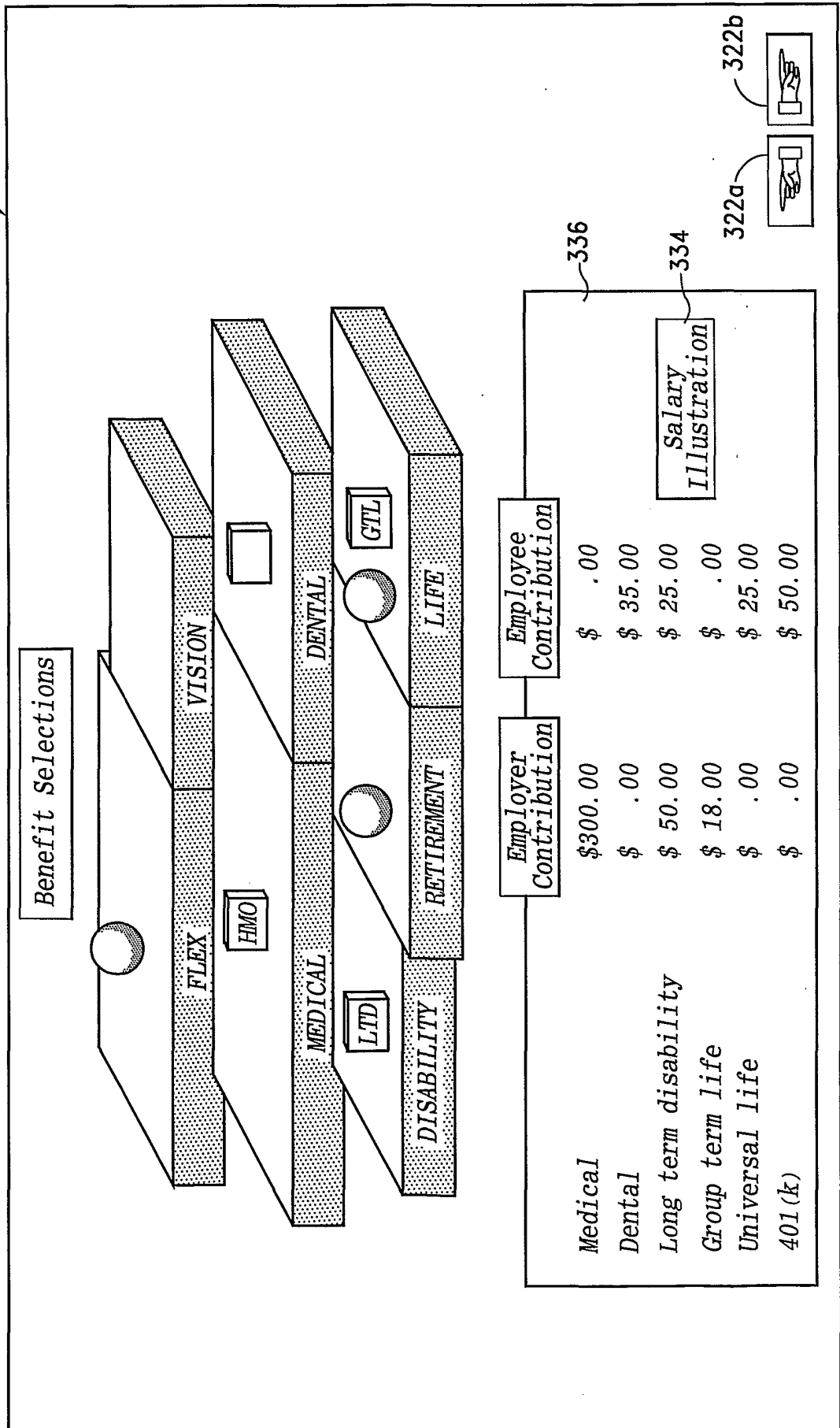


FIG. 8D

300d



300e

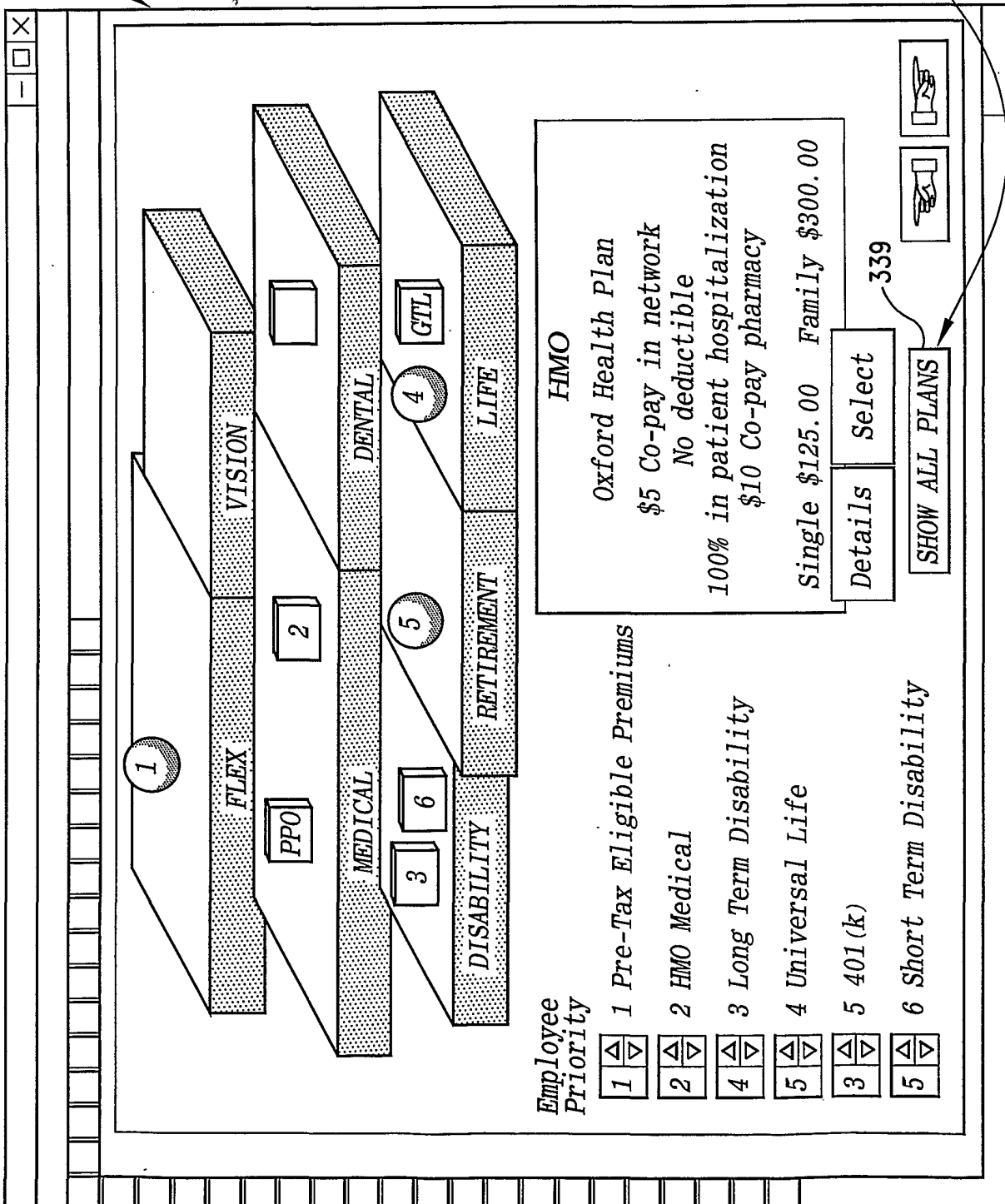
# FIG. 8E

The employee has the opportunity, at this point, to;

- \*view descriptions of the plans by clicking the corresponding text (HMO medical shown here);
- \*reorder priorities based on other personal information or opinion;
- \*and select desired coverages for a financial modeling process.

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Allows Employee to Toggle Views Between Suggested & All Plans



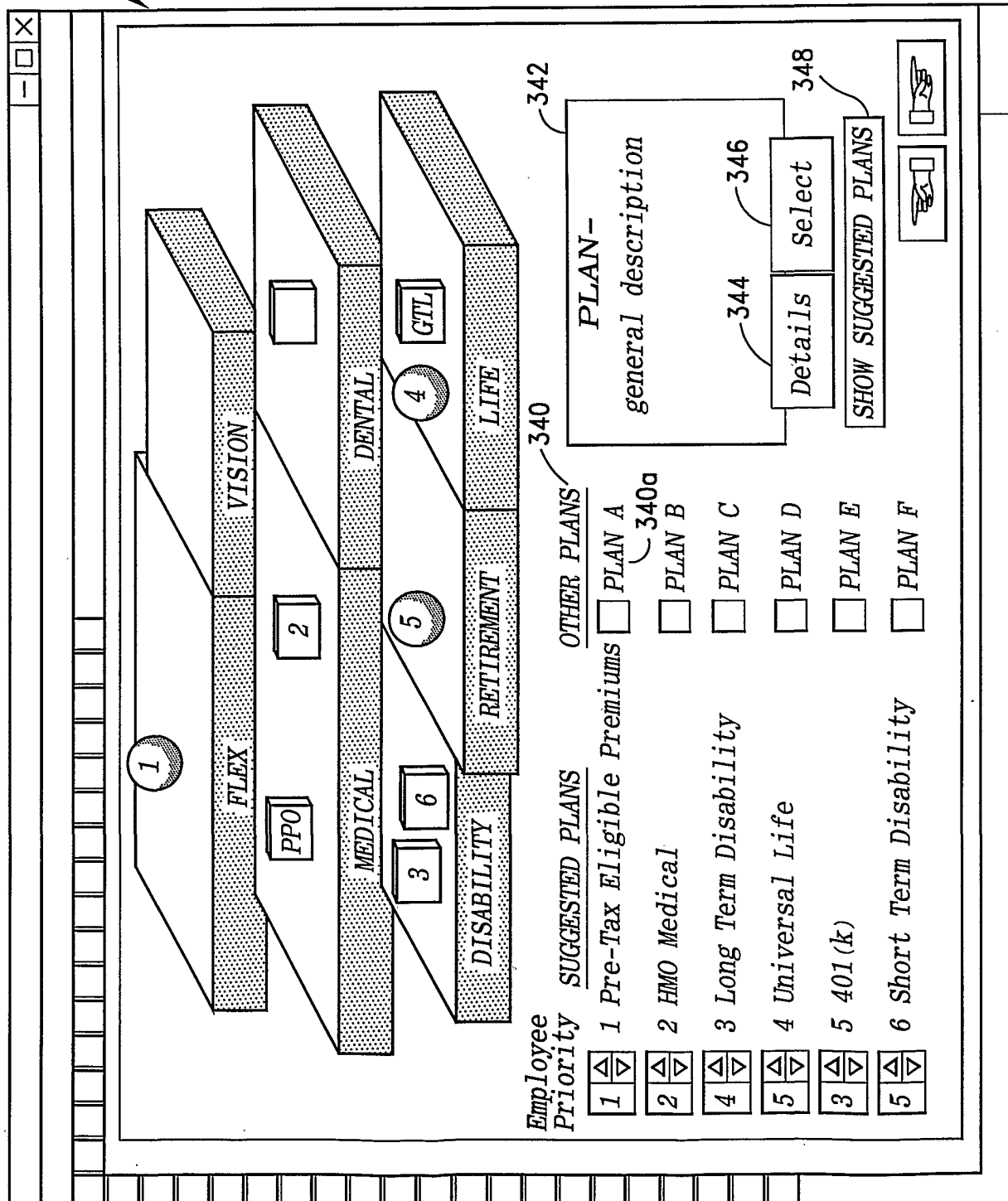
300f

# FIG. 8F

The employee has the opportunity, at this point, to;

- \*view descriptions of the plans by clicking the corresponding text (HMO medical shown here);
- \*reorder priorities based on other personal information or opinion;
- \*and select desired coverages for a financial modeling process.

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## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US01/22260

## A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : G06F 17/60

US CL : 705/1, 4, 7, 35, 36

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : G06F 17/60

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

Please See Extra Sheet.

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages                    | Relevant to claim No. |
|-----------|---|-----------------------|
| Y         | US 5,590,037 A (RYAN et al) 31 December 1996, entire document.  | 1-20N                 |
| Y         | STERN.L. Flex Plans On The Rise. Business & Health. Data Watch. March 1991.                           | 1-20                  |
| A         | Gupta. S. Employers Seek Quality Control Over Health Plans. Business Record. May 1991. vol 87. no. 21 | 1-20                  |
| A         | US 5,878,405 A (GRANT et al) 2 March 1999, entire document.   | 1-20                  |

 Further documents are listed in the continuation of Box C.
  See patent family annex.

|   |     |  |
|---|-----|--|
| * Special categories of cited documents:  | "T" | later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention  |
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| "O" document referring to an oral disclosure, use, exhibition or other means  |     |  |
| "P" document published prior to the international filing date but later than the priority date claimed  |     |  |

Date of the actual completion of the international search

20 SEPTEMBER 2001

Date of mailing of the international search report

05 NOV 2001

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INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US01/22260

**B. FIELDS SEARCHED**

Electronic data bases consulted (Name of data base and where practicable terms used):

APS, DIALOG

search terms:

benits, retirements, medical, health, dental, disability, 401K, pension, managing, controlling, estimating, projecting, goal, priority  
, plan